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REVIEW

Pain Management During the COVID-19 Pandemic

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ABSTRACT

Chronic pain management during the coronavirus disease 2019 (COVID-19) pandemic is a challenging process, especially with growing evidence that COVID-19 infection is associated with myalgias, referred pain, and widespread hyperalgesia. In light of the limited data available for COVID-19-related impact on chronic pain patients, this review explores the changes in the healthcare delivery system due to social distancing and safety precautions to provide the appropriate management of chronic pain patients during the COVID-19 pandemic. Understanding both the general problems facing chronic pain patients as well as specific problems in the COVID-19 era including deconditioning, increased mental health concerns, financial burdens, and potential for medication-induced immune-suppression is vital in the appropriate management of patients. Telemedicine, the practice of caring for patients remotely when the provider and patient are not physically present with each other, is becoming increasingly used and recognized as a valuable tool to both health care providers and patients. This paper concentrates on the proper utilization of the available resources to help patients with the most severe conditions as well as the most vulnerable group. COVID-19 may be associated with a profound effect on both the health care system and patients with chronic pain. As a result, delaying, or stopping, treatment for chronic pain patients will have negative consequences, and strong pain evaluations must be administered to triage patients appropriately. Recent recommendations for the safe use of non-opioid analgesics, opioid analgesics, and interventional pain management procedures are vital to know and understand specifically during the pandemic era. Further researches are needed to identify the advance planning and rapid responses to reduce the impact of the pandemic.

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Key Summary Points
Why carry out this study?
In light of the limited data available for COVID-19-related impact on chronic pain patients, the main objectives of this review are:
To understand the changes in healthcare delivery during the COVID-19 pandemic.
To advise healthcare providers on providing the appropriate management of chronicpain patients.
To concentrate available resources to help patients with the most severe conditions aswell as the most vulnerable group.
What was learned from the study?
Protecting oneself means protecting others, because one's own safety depends on thesafety of the whole community.
COVID-19 is having a profound effect on patients with pain. Delaying, or stopping, treatmentfor chronic pain patients will have negative consequences including increases in pain,disability, and depression
Evidence is promising that telemedicine can help to provide ongoing services to chronic painpatients.

INTRODUCTION

Chronic pain is a significant medical and socioeconomic problem that affects 13.5–47% of the general population and can carry significant financial burden, more than 600 billion dollars annually in the US alone [1]. From a societal perspective, chronic pain not only increases suffering, but impairs daily activities, increases illicit drug consumption, and results in a high frequency of sick leave and disability pensions, leading to high downstream societal cost. Also, it poses a major problem of public health, creates substantial costs for healthcare systems, and disability insurance [2].

Since the outbreak of COVID-19 in China in late 2019, followed by the wide and rapid spread to other countries, more than 10 million individuals have become infected, resulting in more than 500,000 deaths as of June 2020 [3, 4]. During this pandemic, health care providers have been shown to be at a much higher risk of infection. Anesthesia and pain medicine physicians who perform spinal interventions and regional anesthetic blockades are subjected to higher risk of infection compared to many other medical specialties [5].

While many pain syndromes and classifications exist, the biopsychosocial model of pain, emphasizing its multifactorial causes within the biological, psychological, and social factors of the individual, may be the most important to emphasize in the COVID-19-affected world. Well known to pain medicine practitioners, the model emphasizes that pain is not just a response to an injury, but a disruption of the body's homeostatic systems due to a multitude of factors leading to increased stress responses. There is growing evidence that COVID-19 infection is associated with myalgias, referred pain, and widespread hyperalgesia. The importance of these associated conditions cannot be understated, as while the pandemic continues to affect every facet of our lives, the treatment strategies for chronic pain during this time are of vital importance [6]. This article is based on previously conducted studies and does not contain any studies with human participants or animals performed by any of the authors.

EPIDEMIOLOGY

With COVID-19 pandemic's strain on resources, it is more important than ever to highlight the epidemiology of chronic pain given its

significance in health care spending and resource allocation. Between 13.5 and 47% of the population are affected by chronic pain. Chronic pain is widespread in society and almost all adults have experienced at least one episode of musculoskeletal pain associated with injury or overuse [2].

The patterns of chronic pain problems vary greatly by age and sex, e.g., knee pain from osteoarthritis affects over one-third of persons over the age 60 and fibromyalgia tends to affect middle-age women more. Pain conditions are, however, more common in the elderly. In fact, > 60% of individuals greater than 60 years old have been found to have at least one chronic pain condition, commonly at multiple sites [7]. Pain is also associated with arthritis, bone and joint disorders, myofascial disorders, cancers, neurological disorders, and other chronic disorders. While the prevalence of pain is about 1.5–2 times more common in women than in men and the ratio can be as high as over 4 to 1 for specific pain conditions such as fibromyalgia [8].

PROBLEMS FACING CHRONIC PAIN PATIENTS IN THE COVID-19 ERA

While chronic pain patients and pain management have been highlighted in recent years due to issues with the opioid epidemic, the COVID-19 pandemic has brought new problems to already-struggling patients. Problems affecting these patients can be divided into general problems that are exacerbated by the pandemic and specific problems that are new as a result of the pandemic.

1. *General problems affected by COVID-19* General, pre-existing problems that have been exacerbated as a result of the COVID-19 pandemic include opioid overuse, surgical overuse, and a failure to provide education or advice. Regarding opioid overuse, the efficacy of opioids for non-cancer pain management is questionable for both acute and chronic pain conditions. Although limiting the use of opioids is recommended, there is a small subset that may benefit from chronic opioid therapy with a monitoring program that mitigates the risk. There is a correlation with increasing opioid use and an 'epidemic' of prescription opioid-related harm [9, 10].
   The rate of some surgical procedures, e.g., orthopedic and spine surgeries, has increased markedly in recent years [11]. This rise in surgical volume has also led to increased incidence of failed surgery syndromes and non- or semi-emergency procedures. For certain conditions, surgical outcomes are comparable to exercise-based rehabilitation or sham surgery [12].
   Education will need to be provided more frequently in the physician's office. Currently, only 20% of patients with chronic pain were given advice and education in the primary care setting. The same thing applied to the awareness by the risk of COVID-19 transmission. Lack of education is a poor outcome marker and contributes to poor outcomes associated with chronic pain [9].
2. *Specific problems in light of COVID-19* [13] The COVID-19 pandemic has also brought with it a plethora of new problems affecting chronic pain. Significant increase in inactivity due to government lockdown and quarantine orders have resulted in deconditioning, impacting patients who relied on PT or exercise programs as part of their pain management regiment. Along with this, the onset or exacerbation of mental health concerns, including anxiety, depression, post-traumatic stress disorder, and alcohol dependence disorder, have become significant concerns. In fact, the escalation of addiction disorders, including opioid use disorders and protective quarantine/shelter-in-place orders have left individuals struggling with addiction, less access to treatment, as well as less opportunity for distraction. The New York Times has labeled the COVID-19 pandemic "a national relapse trigger" [14].
   Immunosuppression as a result of medication, whether chronic opioid therapy or the use of oral or injectable steroids (e.g., in interventional pain procedures), is especially concerning during a time of global pandemic.

These issues and more have resulted in a significant financial burden on society and patients, including downstream consequences like lack of housing, lack of access to proper nutrition, etc. Issues like disruption to traditional healthcare access due to social distancing and safety protocols have affected all chronic pain suffers, but also disproportionately affects elderly chronic pain patients and those with multiple comorbidities.

The overuse of imaging is another alarm concern as a result of the pandemic. Before COVID-19, around 69% of general practitioners would refer patients for radiography at first presentation, despite routine use discouraged due to a poor relationship of imaging findings with symptoms [9]. Similarly, as physical exams decrease with telemedicine, there is a potential for increased reliance on imaging. This behavior may increase the risk of exposure and subsequent infection by COVID-19.

TELEMEDICINE

Telemedicine is increasingly recognized as a valuable tool to both health care providers and patients. Telemedicine allows providing instructions and guidance for pain relief through a real-time two-way audiovisual communication [15]. As we move into a post-pandemic model of care, telemedicine may be worthy of further evaluation and implementation worldwide. Telemedicine has become an effective way of providing necessary medical services to patients with chronic pain during the COVID-19 epidemic. While allowing patients to remain at home while maintaining continuity of care, telemedicine has allowed for follow-up of chronic conditions [5, 16]. Little data exist unfortunately for telemedicine's role in new patient visits, where physical examination is vital. Advances in telemedicine have also led to The Health Insurance Portability and Accountability Act (HIPAA)-compliant platforms including Zoom, Doximity, and Cisco Webex, etc. With increased telemedicine use, integration into electronic health records will become more common as well [17].

To help guide healthcare professionals caring for pain patients, five related factors should be considered: [6, 18].

1. The public health consequences of COVID-19 for patients with pain and the level of care.
2. The consequences of diminished and alternate/virtual treatments of chronic pain compared to the current in-person model.
3. Triaging patients in order to provide care to those with more urgent needs
4. Options for remote assessment and management.
5. Clinical evidence supporting remote therapies and modalities.

Practical tips for introducing remotely supported pain management [6, 18]:

- Get to know your resources including a robust Internet connection, technology options (computers, smartphones, cellular phones, etc.), videoconferencing platforms (such as Zoom, WebEx, Doximity), electronic medical records.
- Schedule your appointments when there are no distractions for you or the patient.
- Plan and use complementary resources.
- Problem-solve and integrate self-help activities.
- Use experiential learning.
- Explore your patients' living and socioeconomic environment.

PAIN ASSESSMENTS

A strong history identifying pain type, severity, functional impact, and context should be conducted in all patients with chronic pain. This will help the selection of treatment options most likely to be effective [19, 20]. This can be conducted by many tools without direct contact with the patients in order to minimize exposure, e.g., disposable pain charts, pictures, and electronically by phone contacts or through the social media. This can be conducted by telemedicine/eHealth [5].

Generally, Pain Assessment Tools Can Be Classified Into:

Uni-dimensional such as visual analogue scale (VAS), numerical pain rating scale (NPRS), verbal rating scale (VRS), facial expression for pediatric patients or multi-dimensional scores [19].

Multi-dimensional scores are used for the assessment of chronic pain e.g., McGill Pain Questionnaire and Brief Pain Inventory [19].

Neuropathic pain diagnostic scales include a set of pain symptoms, clinical examination or labs, e.g., Leeds Assessment of Neuropathic Symptoms and Signs (LANSS), Douleur Neuropathique en 4 questions (DN4), and Pain DETECT [20].

STRATEGIES FOR CHRONIC PAIN CLINICS AND INPATIENT HOSPITALS

The goals of these strategies to get benefits to both health care providers and patients and to allow the pain clinics, acute and chronic pain services to continue and function during the epidemic. We believe that while in this pandemic, triage will be more important than ever to ensure that risk of spread remains low while providing care to those who are in need of pain relief.

1. *Recommendations for the outpatient pain clinics* [5] We recommend initial screening for all patients using strict control requirements. In order to ensure that patients are matched with an appropriate method of treatment, all patients should be triaged into different levels of care prior to presentation based on a variety of factors. We recommend that pain be measured via the Numeric Pain Rating Scale or/and the Brief Pain Index. A multidimensional assessment may be preferable to a unidimensional assessment due to the multifactorial causes of pain [5]. We recommend triage into three different levels:
   - Level 1:
     - Patients with mild to moderate pain.
     - Clear etiology, pathogenesis, and diagnosis.
     - Had relatively well-controlled comorbidities.

     This group of patients can receive pain medication at home, along with telemedicine/eHealth support.
   - Level 2: (e.g., COVID-19-suspected patients):
     - Level 1 patients who have been exposed to COVID-19-positive individuals or
     - Recently traveled to or from an epidemic area, as determined by the World Health Organization (WHO).
     - Have symptoms suggestive of COVID-19, including fever, night sweats, respiratory symptoms, and others.
     - These patients should self-quarantine at home and should strongly consider getting tested for COVID-19.
   - Level 3:
     - Those with severe pain, and/or suspicion of emergency conditions (i.e., spinal fracture, cauda equina syndrome).

       These patients are to receive immediate treatment in the clinic or should be admitted as inpatients for further testing and treatment.

       Cases from levels 2 and 3 who need physical inspection are immediately sent to an isolation area for further testing and treatment.

       Along with this, we strongly recommend the stratification of providers in the clinic to limit overlap and provider-to-provider exposure.
2. *Recommendations for the inpatient setting* The inpatient chronic pain service brings other concerns in regards to consistent patient exposure in a hospital setting. Contacts between the patient and health care providers should be minimized by scheduling a minimal number of necessary pain patients.

Similarly to our clinic recommendation, one provider should work in a given area at a given time, limiting provider-to-provider exposure as well. Discharged patients can have follow-up appointments via telemedicine/eHealth aids unless they fall under level 3 in the stratification system above. For those patients with severe pain, or with complex conditions that require urgent treatment, there will be a need to be seen as inpatient and practitioners will need to arrange for the necessary pain treatment, including interventions or surgery as required [5].

PAIN MANAGEMENT DURING COVID-19

Current pain medicine practitioners employ a combination of non-pharmacological, pharmacological, and interventional strategies to manage a patient's pain. Current trends in pain medicine focus on multidisciplinary care. In the current model, pharmacological treatment remains a pillar for the management of pain. Multimodal analgesia, or the concurrent use of multiple medications employing different mechanisms of action, has been associated with improved analgesia with fewer side effects [21, 22]. With the rise of telehealth and other methods of healthcare delivery growing during the pandemic, multimodal analgesia may play an increased role in the post-COVID era, and is therefore important to review.

Non-Opioid Analgesics and COVID-19

- ***Acetaminophen/paracetamol:***
  Acetaminophen/paracetamol acts both centrally and peripherally to reduce prostaglandin synthesis from arachidonic acid via inhibition of the cyclooxygenase isoenzymes. The medication should be considered alone or in combination with non-steroidal anti-inflammatory drugs (NSAIDs) in the management of mild-to-moderate pain as part of multimodal analgesia [19]. Paracetamol can also be used safely to alleviate symptoms of COVID-19 such as fever, headache, and acute or chronic pain. However, caution must be observed due to liver toxicity at high doses of paracetamol [23].
- ***NSAIDs***
  Non-selective NSAIDs (e.g., ibuprofen, naproxen, and indomethacin) are effective for mild-to-moderate pain through inhibition of cyclo-oxygenage-1 (COX-1) and cyclo-oxygenage-2 (COX-2) enzymes leading to a reduction of prostaglandins. Prostaglandins mediate pain, fever, inflammation, and swelling, and have a key role in gastric protection and hemostasis [19, 24].
  Prolonged use of non-selective NSAIDs is associated with a higher risk of adverse effects including gastrointestinal disease (dyspepsia, gastritis, peptic ulcer disease, and ulceration), renal toxicity, inhibition of platelet function, and respiratory bronchospasm in some patients with asthma [19, 24].
  NSAIDs are relatively contraindicated in patients with respiratory disorders, as in acute respiratory infections. NSAIDs have also been implicated in acute myocardial infarction and risk of stroke in rare cases [25]. Specific concerns related to COVID-19 and the use of NSAIDs have hypothesized that NSAIDs may upregulate entry through the angiotensin-converting enzyme (ACE) 2 receptors, thereby increasing susceptibility to the virus. These data are still inconclusive [25].
  Selective COX-2 inhibitors (e.g., etoricoxib and celecoxib) COX-2 inhibitors specifically target prostaglandins that mediate pain and inflammation and have less gastric side effects compared to their non-specific NSAID counterparts. COX-2 inhibitors are as effective as classical NSAIDs for the treatment of mild-to-moderate pain, but have been associated with an increased cardiovascular risk [21, 22].
  NSAIDs and COVID-19 Cytokine storm is a poorly understood exaggerated response involving an uncontrolled release of pro-inflammatory cytokines [26]. Adverse outcomes of COVID-19 have been linked to this exaggerated inflammatory response [25].

As cytokine storm has been postulated to play a major role in adverse outcomes of severely ill patients with COVID-19, anti-inflammatories ranging from NSAIDs to glucocorticoids to hydroxychloroquine and others may be beneficial to reduce inflammation before it overwhelms the body's systems [27]. While an anti-inflammatory can reduce inflammation, it may have a limited or poorly understood effect on cytokine storm, which involves multiple cytokines and complex interactions. In other words, an anti-inflammatory agent may affect certain cytokines but not others [28]. Currently, as of June 2020, randomized trials are taking place for medications like canakinumab [29], ruxolitinib [30], and others that focus on specific cytokines.

However, the role of anti-inflammatories that broadly affect cytokines, such as NSAIDs, is unclear. To date, there is no strong evidence that NSAIDs must be avoided in all patients diagnosed with COVID-19. Clinicians must weigh these choices on an individual basis. Even if anti-inflammatory therapy were to be advocated, it is not yet clear which medication therapies provide the most benefit. Similarly, at which point during the disease, at what doses, and for what duration anti-inflammatory therapy should be used is still unknown [25, 31].

Currently, insufficient evidence exists to establish a link between the use of some NSAIDs such as ibuprofen and susceptibility to contracting COVID-19 or the worsening of its symptoms [23, 32].

Alternatively, paracetamol/acetaminophen can be used instead of NSAIDs. Caution must be observed due to liver toxicity at high doses of paracetamol [25]. However, the antipyretic effect of both paracetamol and NSAIDs may mask the symptoms associated with COVID-19 such as a rising fever and thus may delay the diagnosis and rapid management of the infection [33].

Practical tips for the use of NSAIDs during the COVID-19 pandemic:

- For patients with COVID-19, newly prescribed oral NSAIDs might only be used intermittently over a very short period of time [34].
- Clinicians must consider a patient's whole picture with the addition of any new medication, and avoid NSAIDs in those patients where NSAIDs are contraindicated, such as those with peptic ulcer disease or renal dysfunction [25].
- Discontinuation of prescribed NSAIDs for chronic pain conditions is not recommended at this time. There is no reason to fear it might increase their risk of contracting COVID-19 or exacerbate symptoms if previously on treatment [35].
- Acetaminophen (paracetamol) has been proposed as an alternative to NSAID use, but there are also issues with acetaminophen toxicity in high doses [36].

Opioids and COVID-19

Opioids are a treatment for moderate-to-severe pain and both cancer and non-cancer pain. Although consensus exists about their effectiveness in the treatment of chronic cancer pain, long-term opioid use for chronic non-malignant pain is controversial [37]. Opioids have also been used for a wide range of painful conditions including both nociceptive and neuropathic pain [22, 38]. Of importance, in current pain practice, opioids are generally used as only part of a treatment plan, which includes physical therapy, pain psychology, interventional procedures, and other ancillary therapies.

Opioids produce their effect by acting as agonists at various opioid receptors found in the brain, spinal cord, and sites outside the central nervous system (CNS). Opioids are available in different forms and can be used by different routes of administration, e.g., oral, sublingual, intravenous (IV), intramuscular (IM), subcutaneous (SC), transdermal, and neuraxial. Most of the opioids have a similar spectrum of adverse effects, e.g., respiratory depression, sedation, nausea/vomiting, constipation, physical dependence, and opioid use disorder [19, 22, 38]. There is also evidence suggestive that chronic opioid use can produce a chronic pain state [39].

Opioids and the immune system Morbidity and adverse outcomes from COVID-19 are more common in immune-compromised patients. The effects of opioids on the immune system are complex and depend on the type of opioid, dose, nature of immunity, and the patient's situation [40]. In opioid-tolerant patients, opioids are linked to infections like pneumonia [41]. However, pain itself may have an immunosuppressive effect. With that in mind, it is possible that the use of opioids to relieve acute and chronic pain may actually enhance the immune response [42]. Providing adequate analgesia should be achieved without significant adverse events, and opioids with minimal immunosuppressive characteristics may be reasonable options in such situations where opioid use is indicated. Buprenorphine is highly recommended [43], tramadol and oxycodone can be used as a second option [44], while morphine and fentanyl are not recommended due to side effects and addiction potential [43, 45].

Opioid-tolerant patients Many services and guidelines have permitted opioid prescriptions via telemedicine visit or E-health to facilitate delivery and reduce the risk of opioid withdrawal. This is also allowed for patients who need to increase the opioid dose because of a reasonable causes. For patients who may have run out of medications, assessment of withdrawal symptoms and signs can be challenging. Some signs, like agitation, diaphoresis, piloerection, and elevated pulse rate can be observed remotely by the patient or a caregiver [46, 47].

Patients at risk of opioid withdrawal should be scheduled for an in-patient visit. Non-opioid strategies to prevent withdrawal (e.g., using clonidine) are alternative options when there is difficulty in getting the opioids. Emphasis must be placed on the appropriate prescription of opioid medications, as the quarantine and social distancing with the current pandemic has been postulated to lead to worsening of disorders like alcohol dependence and opioid use disorders [46, 47].

Opioids for acute pain Opioid use via telemedicine must be used sparingly and only when absolutely indicated. Current recommendations for non-malignant acute pain recommend a maximum of 7 days [48, 49]. For patients with acute pain or those with severe exacerbation of chronic pain and needing short-term opioids, a short electronic prescription after evaluation via telemedicine or E-health is reasonable. Before prescription, red flags associated with COVID-19 including lethargy, nausea and gastrointestinal symptoms must be excluded [50]. If patients need opioids for longer durations or to be continued, an in-patient visit is recommended to identify patients who might be candidates for opioid prescription or other interventions for pain managements [48, 50].

Transdermal dermal opioids (TD) The fevers and elevated temperature associated with symptomatic COVID-19 may increase absorption from transdermal opioid patches (e.g., fentanyl and buprenorphine) and could increase opioid side-effects [50]. Patients who are prescribed transdermal opioids with increased side effects who become increasingly drowsy or somnolent may require patch strength to be reduced, or alternatively replaced, with short-acting opioid formulations. This should continue until symptomatic infection is resolved and the fever is lowered [50].

Opioids in special situations For patients with implantable intrathecal pumps in need of refill, an in-patient or clinic appointment is required. If the dose has been stable for a long period of time, around the order of 1 year, and the patient does not complain of worsening pain or side effects, an in-home pump refill may be done by special services like home health [51].

Practical tips for opioids with COVID-19 pandemic:

- In all patients receiving opioids chronically, it is recommended that an in-patient visit be performed within 2–3 months for patient's evaluation after a prescription has been provided.
- Before increasing the dose of chronic opioids, it is important to differentiate between disease progression from other opioid drawbacks, e.g., tolerance and hyperalgesia.
- Opioids should be used for pain relief only, while the use of opioids to alleviate non-pain conditions, e.g., sleep, anxiety, or

depression should be monitored and discouraged [51].
- Opioids are also cough suppressants, and this may mask or delay the initial presenting symptoms of COVID-19 infection, and extra importance must be placed on monitoring of respiratory symptoms suggestive of COVID-19 while on opioid therapy.
- Lethargy, nausea, and gastrointestinal symptoms that are associated with COVID-19 infection could be worsened by prescribed opioids, as well as other medication for neuropathic pain like gabapentin or pregabalin [50].

Interventions Pain Therapy and COVID-19

Pain interventions are typically minimally invasive procedures that when appropriately indicated, relieve acute and chronic pain as well as minimize the use of analgesics. Interventional pain management is often performed on an outpatient basis and can be used for diagnostic, prognostic, or therapeutic purposes. Image guidance such as ultrasound, fluoroscopy, or computed tomography can be used during the intervention when clinically indicated [19, 52].

Suggested definitions for the classification of urgency in interventional pain procedures [51]:

- *Elective* These procedures are not time-sensitive; a patient normally could wait greater than 4 weeks to undergo the procedure based on the unique circumstances and no significant harm to the patient is anticipated with postponement of the procedure.
- *Urgent elective* These procedures are time-sensitive; a patient normally could not wait months to undergo the procedure, for unique circumstances, where a delay of the procedure for more than a few weeks could potentially lead to a worsening of a patient's condition.
- *Urgent* These procedures are time-sensitive; a delay in proceeding with a procedure would result in significant exacerbation and worsening of the condition such as emergency visit, inpatient hospitalization, or unintended consequence of analgesics.

Corticosteroids and COVID-19

Corticosteroids are immuno-suppressants that have been linked to increased infection risk. Immuno-suppression has been reported with systemic as well as epidural steroids, putting patients at an increased risk of infection [51–54]. Moreover, a significant number of chronic pain patients are on opioids, well-documented immuno-suppressants. Treating such patients with pain procedures using small amounts of non-systemic corticosteroids may minimize the need for opioids [53, 54].

Randomized controlled trials (RCT) have shown that epidural steroid injection doses exceeding 40 mg methylprednisolone, 20 mg triamcinolone, and 10 mg dexamethasone provide no recognizable pain relief difference compared to lower doses. Some studies have indicated no additional benefits for doses greater than 10 mg triamcinolone or 4 mg dexamethasone [52, 55]. However, Rainvith et al. [56] showed a strong correlation between the epidural volume and pain relief irrespective of the steroid dose.

During the COVID-19 pandemic, physicians may continue to perform epidurals and other injections for selected patients when indicated. Providers should keep in mind, however, that there is no clear evidence of a causative effect between spinal procedures without steroids and the increased risk of infection, suggesting an increased risk of infection with corticosteroid use [53].

Regarding intra-articular injections, clinical trials showed no difference between 40 and 80 mg of triamcinolone for knee injections [57]. Also, it is important to note that many simple procedures such as trigger point injection, steroids has no additional benefit compared to saline [58].

Practical tips for interventional pain therapy with COVID-19:

1. ***General preparations***: The general guidelines and infection control precautions

according to the WHO recommendations must be followed in order to minimize probability of harm during the COVID-19 pandemic. Patients should be informed of the possible risk of infection before intervention. All patients should done face coverings, and those with respiratory symptoms or fever should follow up with their primary physician. All surfaces should be clean and disinfected in the patient care environment between each patient encounter to limit surface-to-person spread of COVID-19 [59, 60].

2. ***High-risk patients*** Procedures should be limited to urgent or emergent cases, as outlined above. The procedure should be conducted in a room designated for such purposes (e.g., negative pressure room). Due to increased risk, physicians who treat high-risk patients should be adequately protected and the use of N95 masks should be highly considered.
   After the procedure, the patient should be monitored in the same room until they can be transferred to an appropriate isolation area or discharged home to shelter in place. Appropriate precautions should be taken during the removal of protective gear [59, 60].
3. ***Personal protective equipment (PPE)*** We strongly consider the use of surgical facemasks, eye shields, and gloves during patient care. N95 masks should be used for emergent procedures or high-risk patients, e.g., COVID-19 symptoms or infected patients, or positive contacts. During the procedures, sterile attire must be donned, and this attire should be discarded after patient treatment [59, 60].
4. ***Pain procedures*** The factors involved in risk stratification include pre-visit risk reduction, exposure time, and body region exposed. For the most common procedures performed, patients are positioned face down, and the contact area is limited and sterilely prepared. Providers may request that patients shower before receiving injections in high-risk situations [59, 60].
   In immunocompromised and high-risk patients, epidural injection with the lowest dose of steroids or without steroids should be considered. For procedures with the potential for aerosolization such as intranasal sphenopalatine ganglion blocks and intra-oral injections, N95 masks should be used as recommended. Deep sedation that may require airway support should be avoided to avoid respiratory distress [59, 60].
5. ***Staffing plans*** The goal of staffing plans should be to minimize "unnecessary" exposure of hospital staff to patients, and to themselves. Only those essential to the physician–patient interaction should be allowed to enter the hospital and patient care areas. Along these lines, procedures should be performed with the minimal number of personnel and staff, ideally by a physician with extensive experience in minimizing risk exposure. It is also recommended to designate one physician to perform all procedures during the same session to minimize potential physician and patient exposure [60, 62].

MANAGEMENT OF PAIN ASSOCIATED WITH COVID-19 INFECTION

Health care providers should be aware that pain may be related to COVID-19 infection in a variety of forms: an early sign of infection, a return of infection, and iatrogenic effects such as prolonged bed rest, immobility, psychological stress, and others.

Patients with COVID-19 usually complain of fever, headache, and mild-to-moderate body pain suggesting viral-induced myalgias [5]. Associated pain that was present before COVID-19 and may be exaggerated by a superimposed viral infection. Mild pain symptoms associated with COVID-19 can be relieved with simple analgesics such as acetaminophen and NSAIDs. Acetaminophen is an alternative to NSAIDs where its use for COVID-19 patients has been linked to a worsening of symptoms [32, 63]. For moderate-to-severe chronic malignant pain, however, opioids with minimal effects on the

immunosuppression (like buprenorphine) are recommended compared to others. It is vital for the practitioner to avoid corticosteroids if a patient has COVID-19 infection, even if asymptomatic at the time of presentation [50].

SUMMARY AND RECOMMENDATIONS

The COVID-19 pandemic has brought unforeseen issues in the field of chronic pain. Shelter in place and social distancing are two of the best ways to limit the spread of infectious respiratory diseases [5]. Protecting oneself means protecting others, because one's own safety depends on the safety of the whole community [4].

In this era of telehealth, it is more important than ever to provide patients with education about their condition and management options and involve them in a shared decision-making processes [9]. Telemedicine can help to provide ongoing services to patients; assessments, treatment, and follow-up. Evidence is promising for the use of telemedicine in the follow-up of chronic pain patients [13].

COVID-19 is having a profound effect on health care and patients with pain. Delaying, or stopping, treatment for patients who are suffering from severe chronic pain will have negative consequences for patients including increases in pain, disability, and depression [13]. This can have significant downstream effects including worsening mental health and addiction disorders, as well as increased future healthcare spending.

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