Impact of coronavirus disease 2019 on chronic pain structures: data from French national survey

Meggane Melchior1, Mikhail Dziadzko*,2,3, Séverine Conradi4,5, Pierrick Poisbeau1, Frédéric Aubrun2,3
1Institut des Neurosciences Cellulaires et Intégratives, Centre National de la Recherche Scientifique et Université de Strasbourg, Strasbourg, 67000, France
2Département d’Anesthésie-Réanimation-Douleur, Hôpital de la Croix-Rousse, Hospices Civils de Lyon, Université Claude Bernard Lyon 1, Lyon, 69004, France
3Research on Healthcare Performance, Institut National de la Santé et de la Recherche Médicale U1290, Université Claude Bernard Lyon 1, Lyon, 69373, France
4Centre Hospitalier Régional Universitaire de Tours de Nancy – Hôpital Central, Nancy, 54000, France
5Laboratoire APEMAC-EPASAM Université de Lorraine, Metz, 57000, France
*Author for correspondence: Tel.: +33 426 109 325; mikhail.dziadzko@chu-lyon.fr

Aims: The authors evaluated the impact of the first coronavirus disease 2019 pandemic wave on French chronic pain structures (CPSs). Methods: An online survey assessed CPS resource allocation, workflow and perceived impact on patient care. Results: All CPS workflow was severely impacted by the reallocation of 42% of specialists. In-person appointments were cancelled by 72% of participants. Follow-up was maintained in 91% of participants (telemedicine). Skills in end-of-life decision-making/counseling were rarely solicited. The perceived impact of the crisis on the experience of patients was high (eight out of ten), with a significant increase in access-to-care delay. Conclusion: CPSs maintained patient follow-up. Special features of CPS specialists were rarely solicited by coronavirus disease 2019 teams experiencing a high workload. Recommendations on optimal CPS resource reallocations have to be standardized in crisis conditions.
resulting in an economic burden\textsuperscript{(16–18)}. Recent evidence on the persistent pain syndrome in COVID-19 survivors may definitely increase the disease burden in the population\textsuperscript{[19,20]}.

French chronic pain structures (CPSs), created in the early 2000s, offers multidisciplinary pain care. More than 240 French CPSs (including 38 pediatric structures) were functional before the COVID-19 outbreak, with an annual estimated volume of 400,000 patients\textsuperscript{[21]}. The typical CPS team is pluriprofessional and is composed of at least 0.5 full-time equivalent physicians and 1.5 full-time equivalent paramedical staff, including nurses, physical therapists, psychologists and administrative personnel\textsuperscript{[22]}. Most CPSs manage all types of chronic pain patients. Only a minority of CPSs are specialized in one specific type of patient (e.g., cancer or pediatric patients). A small proportion of CPSs offer palliative care. In the majority of hospitals, palliative care is an independently functioning unit; however, CPS staff may provide \textit{ad hoc} care. Most French CPS centers did not use telemedicine before the pandemic crisis, but a telephone follow-up was used frequently.

Following the implementation of ‘Plan Blanc’, a large proportion of pain physicians and paramedical staff were allocated to different hospital units. National directives encouraged physical distancing and online medical consultations. As such, French CPSs have had to adapt their workflow, mostly by limiting in-person consultations, suspending or delaying pain management procedures and using telemedicine\textsuperscript{[8,23,24]}.

The objective of this study was to assess CPS human resource allocation, changes in CPS workflow organization and the perceived impact on patient care in the context of the COVID-19 pandemic sanitary crisis. The data obtained will allow us to discuss the workload of French pain specialists, initiate strategies to prevent psychological impact on caregivers and develop possible strategies to maintain patient access to care during similar crises and beyond.

\textbf{Methods}

A semistructured mixed qualitative/quantitative survey research design was used with nonprobability sampling (convenience sample). For the purpose of the study, an anonymous French language online survey, including multiple choice and open questions, was developed by the board of the Société Française d’Etude et de Traitem ent de la Douleur (French Society of Pain Management). The Société Française d’Etude et de Traitement de la Douleur is the French chapter of the International Association for the Study of Pain and a member of the European Pain Federation. The computer-administered survey aimed to identify the new missions given to CPS human resources, assess the strategies to maintain follow-up of chronic pain patients, evaluate the overall impact on the functioning of CPSs, evaluate the perceived impact on patient care and assess whether there were any supply/medication issues or shortages during the period of ‘Plan Blanc’ in the region of the participant’s practice.

A Delphi method was used to design the survey. After identification of the participant’s role and affiliation (region, city, profession), the survey comprised of 57 items divided into three categories: current professional appointment (relocation, same position as before the crisis, etc.) and functions, resources and solutions to maintain chronic pain patient follow-up and information on difficulties with the supply of medications and medical devices. Response options were binary (yes/no), categorical (preselected lists of items), 11-item scales (0 = least important; 10 = most important), continuous (mostly for time-related questions) and open text. The translated questionnaire is provided in the Supplementary data.

The survey invitation was distributed by email to all members of the Société Française d’Etude et de Traitement de la Douleur working in French CPSs 1 month after the ‘Plan Blanc’ termination beginning in June 2020 and made available up to August 2020, with three reminders. Participants were not limited to physicians; all members of CPSs were welcome to participate. Survey participation was voluntary, and no compensation was offered. A secure web application was used for building, collecting and managing the survey data. This study has been declared to the Commission Nationale de L’informatique et des Libertés (French Data Protection Agency).

\textbf{Statistical analysis}

Most data were analyzed descriptively and presented as frequency and percentage or as median and interquartile range (IQR) accordingly. Some participants did not answer all questions or provided answers that could not be analyzed. Percentages were calculated based on the number of responses to each question. Open questions were manually reviewed to identify keywords, and were ‘pile-sorted’ and reported as frequency and percentage whenever possible. Data comparison was made using the Wilcoxon matched-pairs signed rank test or chi-square test. A $p < 0.05$ was considered statistically significant.
Impact of coronavirus disease 2019 on chronic pain structures: data from French national survey

Results

Participants
In total, 224 responses were collected. Most participants were physicians (65%; n = 145), followed by nurses (22%; n = 49), psychologists (9%; n = 21), secretaries (1%; n = 2) and others (3%; n = 7). Most participants were from the mainland.

Human resource reallocation
Of the 224 respondents, 93 (42%) were reallocated to different medical services and were not able to maintain their primary activity at the CPS. Among all respondents, 143 (64%) were volunteers to be reallocated. Half (72 of 143) were indeed reallocated, and 28% (23 of 81) of the participants who were not volunteers were nevertheless reallocated, responding to institutional and sanitary needs. More than a third of participants were assigned to COVID-19 patient care units, including medicine and intensive care units (ICUs) (Figure 1 & Table 1).

Almost half (48%; n = 69) of the physicians participated in on-call or at-hospital 24-h shift care. 76 (58%) of the 130 participants who could stay at their initial position also worked in a COVID or non-COVID ICU, operating room, nursing home, palliative care, non-COVID medical or surgical unit, sanitary reserve, emergency medical services or on-call or 24 h shift care. A heterogeneous proportion of respondents participated in psychological support offers (listening groups). There were 29 (13%) different specialists in listening groups for patients and families - including psychologists (48%; n = 10), physicians (10%; n = 15), and nurses (6%; n = 3). 49 (22%) specialists were offering psychological support for clinicians. The following CPS specialists were involved – psychologists (81%; n = 17); physicians (17%; n = 25); nurses (8%; n = 4). Reallocated respondents often combined different activities. 89 respondents detailed their functions in newly created structures. Physicians (n = 59) mainly joined chronic pain telemedicine consultations, COVID crisis cells (management and ethics), COVID units or consultations, ICU or emergency room night shifts, non-COVID units or on-call chronic pain and palliative care. Pain nurses (n = 17) mainly performed biological samplings for COVID patients. Psychologists (n = 6) were mainly involved in the creation of a family/patient psychological hotline as well as psychological or medical support for clinicians. Table 1 details the different areas in which participants were allocated.

Maintaining in-person appointments & the use of telemedicine
A total of 28% (55 of 197) of respondents maintained in-person appointments, mostly for urgent reasons, including patients with severe pain, acute-on-chronic pain, acute neuropathic or facial pain (36%; n = 20), cancer or palliative care (33%; n = 18) or interventional pain treatment procedures (5%; n = 3), and for new patients (9%; n = 5). One respondent maintained in-person appointments for clinicians/colleagues. 11 (20%) participants did not specify their criteria for in-person appointments.

Telemedicine solutions, including telephone calls and video consultations, were used by 91% (180 of 197) of respondents. Telephone calls were used by 92% (n = 165) of telemedicine users, and 49% (n = 89) used video consultation through online software. Video calls were used in more than half (64%; n = 116) of cases involving existing patients but also for new patients (29%; n = 52), patients who specifically asked for them (48%; n = 87) and patients with specific criteria (36%; n = 65). These criteria included unsatisfactory pain management/re-evaluation...
Table 1. Chronic pain structure human resource allocations during the coronavirus disease 2019 crisis

| Areas of reallocation† | Overall n = 224 | Physicians n = 145 (64%) | Nurses n = 49 (23%) | Psychologists n = 21 (9%) | Secretaries n = 2 (1%) | Other n = 7 (3%) |
|------------------------|----------------|--------------------------|---------------------|--------------------------|-----------------------|-----------------|
| Stayed at their position | 130 (58%) | 92 (67%) | 14 (29%) | 14 (67%) | 2 (100%) | 3 (43%) |
| Volunteered to be reallocated | 143 (64%) | 92 (63%) | 35 (71%) | 10 (48%) | 1 (50%) | 4 (57%) |

† Most reallocated respondents combined different activities (i.e., answered yes for multiple items) or participated in a COVID-related unit on top of their initial position (i.e., answered yes to 'could you stay at your initial position' and multiple other items).
‡ Some participants did not answer all questions or provided answers that could not be analyzed. Percentages were calculated based on the number of responses to each question.
COVID: Coronavirus disease; ICU: Intensive care unit; SAMU/SMUR: Service d’aide médicale urgente/services mobiles d’urgence et de réanimation.

of treatment (17%; n = 11), anxiety or emotional troubles (15%; n = 10), transcutaneous electrical nerve stimulation (TENS) follow-up (9%; n = 6), cancer or chemotherapy (9%; n = 6), acute pain or reactivation of symptoms (5%; n = 3) and risk of severe COVID (5%; n = 3). 15 (23%) participants did not specify their criteria.

Among respondents who were not familiar with telemedicine consultations before the COVID-19 crisis, 57% (85 of 150) recognized telephone consultations as useful and 40% (n = 60) considered them a precious tool. Video-assisted consultations were ranked as useful by 49% (42 of 85) of respondents and as a precious tool by 42% (n = 36). Overall, participants positively rated both methods, with a median score of 7 (IQR: 5–8) for both telephone and videoconferences on a scale of 0 (no interest) to 10 (major interest).

A quarter (49 of 197) of participants maintained hospital day care for the following reasons: capsaicin patch application (39%; n = 19); intrathecal pump management (29%; n = 14); ketamine infusion (10%; n = 5); patients with complex pain, cancer or neuropathy (6%; n = 3); patients with intravenous morphine pump (2%; n = 1); and patients without any risk factors who needed treatment (2%; n = 1). In one CPS, hospital day care was maintained for all patients. 12 (25%) participants did not specify their reasons for maintaining hospital day care.
Impact on CPS team & CPS daily work
At the time of the survey, the respondents’ CPS teams were restored completely in 62% (116 of 188) of cases and partially in 35% (66 of 188) and not restored at all in 3% (six of 188). Partial return to the fully equipped CPS team was because of absence of psychologists (95%), physicians (92%), nurses (86%), secretaries and others (71%). Almost half (46%; 87 of 188) of the participants indicated that the pandemic will deeply change the way they perform their daily work. A large majority will continue to use teleconsultation when possible, in particular for at-risk patients or patients living far from the pain structure (47%; n = 41). Moreover, a majority of participants indicated that following the crisis the organization of consultation will be adapted, with an impact on the welcoming of patients and an increase in barrier measures and time between patients as a result of disinfection of the room and equipment (15%; n = 13). A few participants indicated that they had accumulated a significant backlog that would be difficult to catch up with (6%; n = 5) and that they will update the way they deal with new patients by making them fill in an auto-evaluation form before the first appointment (2%; n = 2), develop therapeutic education for patients (2%; n = 2) and have a decreased amount of time to dedicate to pain structures (2%; n = 2). Other answers included the use of computer-based files for patients instead of paper documents; increased use of hypnosis; more listening skills for caretakers in response to the high anxiety level of patients following the crisis; more reactivity, anticipation and synergy; and a change in hospitalization mode. 18 (21%) participants did not specify their treatment adaptation.

Perceived impact on patients
According to the opinions of respondents (n = 197), disruption in the established workflow of CPSs due to the SARS-CoV-2 outbreak will have a strong impact on patients, with a median score of 8 (IQR: 7−9) on a scale of 0 (no impact) to 10 (major impact). This is related to the estimated delay in appointments before and since the crisis, which was reported to be increased from a median of 3 (IQR: 1–5) to 3.5 (IQR: 1–6) months (p < 0.001).

Supply issues & treatment adaptation
The altered supply was noticed for medications (25%; 46 of 185) and medical devices/materials (23%; 43 of 185). Participants mostly listed midazolam (57%; n = 26), propofol (20%; n = 9), ketamine (9%; n = 4), opioids (9%; n = 4) and dronabinol (7%; n = 3). Provision issues for materials and medical devices were associated with lack of protective equipment (masks, gowns, antiseptic gel, gloves) (65%; n = 28) and TENS units (12%; n = 5). Five (11%) respondents did not specify any provision problems.

A third (33%; 61 of 185) of respondents reported that they had to change the treatment of their patients during the crisis. The majority of treatment adaptations (36%; n = 22) were associated with a decrease in or complete withdrawal of NSAID treatment. Other adaptations were associated with procedures usually administered in hospital day care (TENS, capsaicin patch, intravenous infusions) (10%; n = 6). Respondents reported an increase in anxiolytic/antidepressant prescriptions (7%; n = 4) and replacement of midazolam with other sedatives in palliative care (8%; n = 5). Other changes included the use of pharmacological treatment to replace nonpharmacological techniques unavailable during the crisis (5%; n = 3), opioid rotation (7%; n = 4), treatment adaptations linked to antiemetic supply issues (5%; n = 3) and treatment for migraine crisis (2%; n = 1). 13 (27%) participants did not specify any treatment adaptation.

Discussion
During the COVID-19 sanitary crisis, 42% of human resources (mostly physicians and nurses) across France were detached from CPSs following the ‘Plan Blanc’ deployment. A total of 47% of reallocated respondents were involved in the psychological support of caregivers, patients and families or palliative care. Such reallocation led to a more than two-thirds reduction in in-person appointments, although an effort was made to maintain physical consultations for urgent chronic pain care, cancer and palliative patients and for interventional procedures. Only a quarter of day care hospitalizations were maintained, favoring patients with the need for interventional pain treatment. As a response to this situation, telemedicine solutions were developed, with telephone calls being the most widely used method (92%). Half of respondents used videoconferences – in one-third of cases for new patients. Telemedicine solutions were ranked as important tools, with more than 40% of respondents rating them as precious. Caregivers perceived the impact of the crisis on the experience of patients to be high (eight out of ten), with an expected significant increase in access-to-care delays. One-third of responding physicians have modified
patient treatment, mostly due to temporary NSAID withdrawal. A shortage in supply was reported by a quarter of respondents, mostly with regard to midazolam, anesthesia-related drugs, protective equipment and TENS units.

This clearly demonstrates that French CPSs were strongly affected by the COVID-19 crisis. Despite this serious impact, many efforts were made to maintain follow-up and new patient management. This included the preservation of in-person consultations and day care hospitalizations as well as communication with patients via the widespread use of telemedicine. No shortage of critically important medications (e.g., acetaminophen, chronic pain-specific psychoactive drugs and opioids) was reported. After the termination of ‘Plan Blanc,’ all CPSs regained their staff quickly.

A few reports have begun to be published in the literature and are in line with what the authors observed in French CPSs. This includes Europe, where headache management and chronic pain centers reported huge limitations in in-person consultations, cancelled or postponed treatments and increased use of telemedicine, making access to medical treatment and patient education more difficult [6–8]. The same has also been observed in India [9], China [4], Canada [5] and the USA, where chronic pain patients had decreased access to usual care during the pandemic [6].

Some recent studies have shown that the COVID crisis exacerbated symptoms in patients suffering from chronic pain, migraine or small fiber neuropathy, with associated increased anxiety levels and a catastrophizing attitude toward pain [8–12]. The role of SARS-CoV-2 infection as a trigger for chronic pain conditions is being studied [19,20]. In line with the authors’ results, pain physicians have reported increased prescribing of pain medications, particularly opioids and cannabinoids, and increased psychological distress in patients [5,6]. However, several aspects of CPS functioning and management during the ‘Plan Blanc’ have to be discussed.

First, pain physicians and nurses were mostly reallocated to COVID units, with a concomitant increase in workload and night shifts. Of the 46% who were not volunteered for reallocation, almost one-third (28%) had to join different structures, including COVID units. Such mandatory reallocation, which is associated with stress, lack of equipment and high workload, may be a source of exhaustion [25] and burnout, both of which have been documented worldwide [26].

A recent study by the American Society of Interventional Pain Physicians indeed reported that 52% of participants felt burned out at the time of their survey (7 weeks after the start of the pandemic) [27]. Psychological support and listening were instituted for caregivers, mostly as local initiatives, with the participation of CPS staff. However, a long-term strategy to support healthcare workers and prevent burnout and psychological impact will be needed in case of resurgence of the crisis [26].

Second, many efforts were made to maintain follow-up and new patient management. This included the preservation of in-person consultations and day care hospitalizations as well as communication with patients via the successful use of telemedicine. There was no difference in rankings for telephone calls or video consultations for chronic pain patients, but half of the respondents reported using video consultations. However, this might be limited by material aspects, as patients need appropriate equipment to have access to video consultations.

Telehealth technology is promising for pain care, and interest has already been demonstrated, not only for patient follow-up but also for communication-based and behavioral interventions [14]. Switzerland’s experience of telemedicine solutions for chronic pain patient follow-up has revealed sufficient adherence to this technology but has also evidenced that acceptance is lower in patients with higher levels of pain and anxiety [28–30]. Although telemedicine may not be a substitute for in-person interactions [4,5,23,24], it could still be an interesting tool even beyond this crisis [30,31]. For instance, the use of smartphone-based behavioral intervention has shown better adherence and is associated with greater reductions in pain and disability in adolescents with chronic pain [32].

Several participants acknowledged the importance of telemedicine, indicating a willingness to use teleconsultations in the future. This could be more convenient for some patients and may provide an effective and simple follow-up tool. Again, in the case of a sanitary crisis, a predefined telehealth strategy for maintaining follow-up as well as triage procedures to determine the necessity of an in-person appointment would be necessary.

Third, a lot of ‘fake news’ circulated on social networks and in the media during the beginning of the pandemic [33]. For instance, the NSAID COVID-19 hoax phenomenon, which was immediately criticized [34], directly impacted prescription patterns in chronic pain patients. Unverified information on NSAIDs as a factor worsening the course of SARS-CoV-2 infection, published by Le Figaro (the oldest national newspaper), was taken seriously by many physicians [35]. Although the NSAID stop period was short, as many as 33% of pain physicians had to adapt established pain treatment in the setting of restricted access of patients to CPSs. In a crisis situation, one cannot prevent the consequences associated with the spread of nonvalidated information.

Finally, chronic pain specialists have specific knowledge related to managing care-associated pain (especially in the ICU) and guiding discussions regarding limiting or withdrawing care in end-of-life situations.
Impact of coronavirus disease 2019 on chronic pain structures: data from French national survey

Research Article

Reported international initiatives may include the use of pain physicians and nurses as palliative care specialists, not only for cancer and end-of-life patients but also in severe COVID-19 patients with ineffective critical life support [36] or in whom nursing care has been chosen (limitation of care) [37]. The CPS staff may play an important role supporting frontline colleagues and families and offering spiritual support. The skills of pain clinicians in neurocognitive interventions to reduce stress and anxiety were not optimally exploited. The latter is of particular importance for fellow caregivers dealing with an unusually high workload under conditions of restrained resources. Only CPS psychologists were massively involved in such an activity (80%). Pain management in ICU patients, which is often not seen as a priority in the context of pandemic overload, may have also been improved in collaboration with pain specialists.

The main limitation of this study is the response rate, which was difficult to evaluate because of the database structure of professional emails. However, analyzed responses came from clinicians, who were motivated to share their experience during the pandemic wave. The authors’ survey reflects the staff perception of the crisis and its organizational impact but not the perception and view of the patient. Increased access-to-care delays were noted. Although statistically significant, this difference should be interpreted with caution, as it corresponds only to an estimation done by the participants and collected immediately after the end of ‘Plan Blanc’.

Recently, strategies to minimize the impact of the crisis on CPS management have been created. These include criteria for postponing interventional procedures, reducing in-person consultations (except for urgent procedures), encouraging the use of telemedicine for pre- and post-procedure evaluations, encouraging multidisciplinary therapy for the psychosocial aspects of chronic pain and avoiding new implantable devices in the context of a sanitary crisis [38–41].

Conclusion

During the March–April 2020 COVID-19 crisis, all French CPSs were severely impacted, with a 42% reduction in human resources. Despite a two-thirds reduction in in-person appointments, the follow-up of chronic pain patients was maintained, and access to physical appointments was reserved for urgent reasons such as severe pain as well as cancer and palliative care patients. Few cases reported a disruption of pain treatment due to altered provision of drugs. Chronic pain specialists’ specific knowledge of palliative/end-of-life care, neurocognitive interventions, alternative medicine and acute pain management was underutilized, and in almost 30% of specialists, who were reallocated against their wishes, burnout may be expected.

National recommendations and an action plan are necessary for efficient management of CPS centers and the use of specific knowledge of CPS human resources in a sanitary crisis. This should take into account the possible decrease in human resources and detail recommendations on the use of teleconsultations, triage procedures and criteria to maintain in-person consultations and interventional treatments as well as treatment replacement strategies for all chronic pain patients.

Summary points

- The first coronavirus disease 2019 wave severely impacted all specialized care structures, including chronic pain structures.
- In France, this has led to >40% reduction in human resources and two-thirds reduction in in-person appointments for patients.
- Pain specialists perceive the impact of such disruption on patient care as major.
- Of reallocated pain specialists, 30% had their occupation changed against their wishes, which is a source of potential burnout.
- The crisis promoted telemedicine consultations.
- Pain specialists’ specific knowledge of palliative care, end-of-life decisions and counseling was underutilized.
- Recommendations and an action plan are necessary for more efficient management of chronic pain structure human resources.

Supplementary data

To view the supplementary data that accompany this paper please visit the journal website at: www.futuremedicine.com/doi/suppl/10.2217/cer-2022-0003

10.2217/cer-2022-0003
Author contributions
All authors contributed to the design and implementation of the study and acquisition and interpretation of the data and participated in the revision of the drafted manuscript. M Melchior performed statistical analysis and drafted the manuscript. All authors have read and approved the final manuscript.

Acknowledgments
The authors thank N Grisolet for collecting/sorting the data and the steering committee of the International Association for the Study of Pain French chapter (Société Française d’Etude et de Traitement de la Douleur) for its support while preparing the manuscript. P Poisbeau is a senior fellow at the Institut Universitaire de France. M Melchior and P Poisbeau thank the IdEx program of excellence at the University of Strasbourg (PIA3, contract ANR-17-EURE-0022, EURIDOL Graduate School of Pain).

Financial & competing interests disclosure
The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending or royalties.

No writing assistance was utilized in the production of this manuscript.

Ethical conduct of research
The authors state that they have obtained appropriate institutional review board approval or have followed the principles outlined in the Declaration of Helsinki for all human or animal experimental investigations. In addition, for investigations involving human subjects, informed consent has been obtained from the participants involved.

Data sharing statement
Data may be shared upon request to the corresponding author for a period of 2 years after publication of the study.

References
Papers of special note have been highlighted as: ● of interest; ●● of considerable interest

1. DGS. Aide à l’organisation de l’offre de soins en situations sanitaires exceptionnelles (2014). https://solidarites-sante.gouv.fr/IMG/pdf/organisation_offre_de_soins_ek_bdc.pdf
2. Code-De-La-Sante-Publique. Section 2: plan blanc d’établissement (Articles R3131-4 à R3131-5) (2014). www.legifrance.gouv.fr/codes/id/LEGIArt1000006912054/2007-08-28
3. Sahoo RK, Jadon A, Dey S, Surange P. COVID-19 and its impact on pain management practices: a nation-wide survey of Indian pain physicians. Indian J. Anaesth. 64(12), 1067–1073 (2020).
4. SongXJ, Xiong DL, Wang ZY, Yang D, Zhou L, Li RC. Pain management during the COVID-19 pandemic in China: lessons learned. Pain Med. 21(7), 1319–1323 (2020).
5. Lynch ME, Williamson OD, Banfield JC. COVID-19 impact and response by Canadian pain clinics: a national survey of adult pain clinics. Can. J. Pain 4(1), 204–209 (2020).
6. Joyce AA, Conger A, McCormick ZL et al. Changes in interventional pain physician decision-making, practice patterns, and mental health during the early phase of the SARS-CoV-2 global pandemic. Pain Med. 21(12), 3585–3595 (2020).
7. Lacasse A, Page MG, Dassie L et al. Impact of the COVID-19 pandemic on the pharmacological, physical, and psychological treatments of pain: findings from the Chronic Pain & COVID-19 Pan-Canadian study. Pain Rep. 6(1), e891 (2021).
8. Kleinmann B, Abberger B, Kiesellbach K, Wolter T. Patients with chronic pain prefer maintenance of pain treatment despite COVID-19 pandemic restrictions. Pain Physician 24(2), 165–173 (2021).
9. Al-Hashel JY, Ismail II. Impact of coronavirus disease 2019 (COVID-19) pandemic on patients with migraine: a web-based survey study. J. Headache Pain 21(1), 115 (2020).
10. Consonni M, Telesca A, Grazzi L, Cazzato D, Lauria G. Life with chronic pain during COVID-19 lockdown: the case of patients with small fibre neuropathy and chronic migraine. Neurrol. Sci. 42(2), 389–397 (2021).
11. Gentile E, Delussi M, Abagnale C et al. Migraine during COVID-19: data from second wave pandemic in an Italian cohort. Brain Sci. 11(4), 482 (2021).
12. Dassie L, Page MG, Lacasse A et al. Chronic pain experience and health inequities during the COVID-19 pandemic in Canada: qualitative findings from the Chronic Pain & COVID-19 Pan-Canadian study. Int. J. Equity Health 20(1), 147 (2021).
13. Nieto R, Pardo R, Sora B, Feliu-Soler A, Luciano JV. Impact of COVID-19 lockdown measures on Spanish people with chronic pain: an online study survey. J. Clin. Med. 9(11), 3558 (2020).
14. Nau C. Telemedizin: chancen in der schmerztherapie. *Anaesthesiol. Intensivmed. Notfallmed. Schmerzther.* 52(2), 118–126 (2017).
15. Bouhassira D, Lanteri-Minet M, Attal N, Laurent B, Touboul C. Prevalence of chronic pain with neuropathic characteristics in the general population. *Pain* 136(3), 380–387 (2008).

- Provides important information on the epidemiology of chronic pain.
16. Brevik H, Collen B, Ventafridda V, Cohen R, Gallacher D. Survey of chronic pain in Europe: prevalence, impact on daily life, and treatment. *Eur. J. Pain* 10(4), 287–333 (2006).
17. Chenaf C, Delorme J, Delage N, Ardid D, Eschalier A, Authier N. Prevalence of chronic pain with or without neuropathic characteristics in France using the capture-recapture method: a population-based study. *Pain* 159(11), 2394–2402 (2018).

- Provides important information on the epidemiology of chronic pain.
18. Hadjiat Y, Serrie A, Treves R, Chomier B, Geranton L, Billon S. Pain associated with health and economic burden in France: results from recent national health and wellness survey data. *Clinicoecon. Outcomes Res.* 10, 53–65 (2018).
19. Cascella M, Del Gaudio A, Vittori A et al. COVID–pain: acute and late-onset painful clinical manifestations in COVID-19 – molecular mechanisms and research perspectives. *J. Pain Res.* 14, 2403–2412 (2021).

- Provides a review of molecular mechanisms of persistent pain in coronavirus disease 2019 (COVID-19) survivors.
20. Vittori A, Lerman J, Cascella M et al. COVID-19 pandemic acute respiratory distress syndrome survivors: pain after the storm? *Anesth. Analg.* 131(1), 117–119 (2020).
21. Société Française d’Étude et de Traitement de la Douleur. *Livre Blanc de la Douleur 2017*. Éditions Med-Line, Paris, France (2017).
22. Société Française d’Étude et de Traitement de la Douleur. Structures douleur chronique en France (SDC): guide de bonnes pratiques. Éditions Med-Line, Paris, France (2019).
23. Lopez-Bravo A, García-Azorin D, Belvis R et al. Impact of the COVID-19 pandemic on headache management in Spain: an analysis of the current situation and future perspectives. *Neurologia* 35(6), 372–380 (2020).
24. Grazzi L, Rizzoli P. The adaptation of management of chronic migraine patients with medication overuse to the suspension of treatment protocols during the COVID-19 pandemic: lessons from a tertiary headache center in Milan, Italy. *Headache* 60(7), 1463–1464 (2020).
25. El-Hage W, Hingray C, Lemogne C et al. Health professionals facing the coronavirus disease 2019 (COVID-19) pandemic: what are the mental health risks? *Encephale* 46(3S), S73–S80 (2020).
26. Raudenska J, Steinerova V, Javurkova A et al. Occupational burnout syndrome and post-traumatic stress among healthcare professionals during the novel coronavirus disease 2019 (COVID-19) pandemic. *Best Pract. Res. Clin. Anaesthesiol.* 34(3), 553–560 (2020).

- Provides a comprehensive review of burnout and post-traumatic stress disorder in healthcare professionals during the COVID-19 pandemic.
27. Jha SS, Shah S, Calderon MD, Soin A, Manchikanti L. The effect of COVID-19 on interventional pain management practices: a physician burnout survey. *Pain Physician* 23(4S), S271–S282 (2020).
28. Harnik MA, Blattler L, Limacher A, Reisig F, Grosse Holtforth M, Streitberger K. Telemedicine for chronic pain treatment during the novel coronavirus disease 2019 (COVID-19) pandemic acute respiratory distress syndrome survivors: pain after the storm? *Pain Pract.* 21(8), 934–942 (2021).
29. HAS. Chronic pain: identification, assessment and referral of patient with chronic pain syndrome (2008). www.has-sante.fr/upload/docs/application/pdf/2010-09/chronic_pain_guideline.pdf

- Provides a framework for e-health solutions with regard to pain management.
30. Eccleston C, Blyth FM, Dear BF et al. Managing patients with chronic pain during the COVID-19 outbreak: considerations for the rapid introduction of remotely supported (eHealth) pain management services. *Pain* 161(5), 889–893 (2020).
31. Cascella M, Marinangeli F, Vittori A et al. Open issues and practical suggestions for telemedicine in chronic pain. *Int. J. Environ. Res. Public Health* 18(23), 12416 (2021).
32. de la Vega R, Ritterband L, Palermo TM. Assessing digital health implementation for a pediatric chronic pain intervention: comparing the RE-AIM and BIT frameworks against real-world trial data and recommendations for future studies. *J. Med. Internet Res.* 22(9), e19898 (2020).
33. Orso D, Federici N, Coperti R, Vetrugno L, Bove T. Infodemic and the spread of fake news in the COVID-19-era. *Eur. J. Emerg. Med.* 27(5), 327–328 (2020).
34. Varrassi G. Warning against the use of anti-inflammatory medicines to cure COVID-19: building castles in the air. *Adv. Ther.* 37(5), 1705–1707 (2020).
35. Roy S. Coronavirus: alerte sur l’ibuprofène et autres anti-inflammatoires. *Le Figaro* (2020). www.lefigaro.fr/sciences/coronavirus-alerte-sur-l-ibuprofene-et-autres-anti-inflammatoires-20200314
36. Rim F, Kelly M, Meletio J, Liu S. Restructuring the peri-operative pain service to palliative care as a response to the COVID-19 pandemic. *HSS J.* 16(Suppl. 1), 170–172 (2020).
37. Fusi-Schmidhauser T, Preston NJ, Keller N, Gamondi C. Conservative management of COVID-19 patients – emergency palliative care in action. *J. Pain Symptom Manage.* 60(1), e27–e30 (2020).
38. Deer TR, Sayed D, Pope JE et al. Emergence from the COVID-19 pandemic and the care of chronic pain: guidance for the interventionalist. *Anesth. Analg.* 131(2), 387–394 (2020).

39. Cohen SP, Baber ZB, Buvanendran A et al. Pain management best practices from multispecialty organizations during the COVID-19 pandemic and public health crises. *Pain Med.* 21(7), 1331–1346 (2020).

40. Shanthanna H, Strand NH, Provenzano DA et al. Caring for patients with pain during the COVID-19 pandemic: consensus recommendations from an international expert panel. *Anaesthesia* 75(7), 935–944 (2020).

41. Puntillo F, Giglio M, Brienza N et al. Impact of COVID-19 pandemic on chronic pain management: looking for the best way to deliver care. *Best Pract. Res. Clin. Anaesthesiol.* 34(3), 529–537 (2020).