



Strategies to prevent long-term opioid use following trauma: a Canadian practice survey

Stratégies pour éviter l'utilisation à long terme des opioïdes après un traumatisme : enquête sur les pratiques canadiennes

Mélanie Bérubé, RN, PhD · Caroline Côté, NP, PhD (cand.) · Lynne Moore, PhD · Alexis F. Turgeon, MD, MSc · Étienne L. Belzile, MD · Andréane Richard-Denis, MD, MSc · Craig M. Dale, RN, PhD · Gregory Berry, MD, MEd · Manon Choinière, PhD · Gabrielle M. Pagé, PhD · Line Guénette, BPharm, PhD · Sébastien Dupuis, BPharm, MSc · Lorraine Tremblay, MD, PhD · Valérie Turcotte, NP, MA · Marc-Olivier Martel, PhD · Claude-Édouard Chatillon, MD · Kadija Perreault, PT, PhD · François Lauzier, MD, MSc

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Abstract

Purpose To evaluate how Canadian clinicians involved in trauma patient care and prescribing opioids perceive the use and effectiveness of strategies to prevent long-term opioid therapy following trauma. Barriers and facilitators

to the implementation of these strategies were also assessed.

Methods We conducted a web-based cross-sectional survey. Potential participants were identified by trauma program managers and directors of the targeted departments in three Canadian provinces. We designed our questionnaire using standard health survey research methods. The questionnaire was administered between April 2021 and November 2021.

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M. Bérubé, RN, PhD (✉)
Population Health and Optimal Practices Research Unit
Research Unit (Trauma – Emergency–Critical Care Medicine),
CHU de Québec-Université Laval Research Centre, 1401, 18e
rue, Quebec City, QC G1V 1Z4, Canada
e-mail: melanie.berube@fsi.ulaval.ca

Faculty of Nursing, Université Laval, Quebec City, QC, Canada

Quebec Pain Research Network, Sherbrooke, QC, Canada

C. Côté, NP, PhD (cand.)
Population Health and Optimal Practices Research Unit
Research Unit (Trauma – Emergency–Critical Care Medicine),
CHU de Québec-Université Laval Research Centre, 1401, 18e
rue, Quebec City, QC G1V 1Z4, Canada

Faculty of Nursing, Université Laval, Quebec City, QC, Canada

L. Moore, PhD
Population Health and Optimal Practices Research Unit
Research Unit (Trauma – Emergency–Critical Care Medicine),

CHU de Québec-Université Laval Research Centre, 1401, 18e
rue, Quebec City, QC G1V 1Z4, Canada

Department of Social Preventive Medicine, Université Laval,
Quebec City, QC, Canada

A. F. Turgeon, MD, MSc
Population Health and Optimal Practices Research Unit
Research Unit (Trauma – Emergency–Critical Care Medicine),
CHU de Québec-Université Laval Research Centre, 1401, 18e
rue, Quebec City, QC G1V 1Z4, Canada

Division of Critical Care Medicine, Department of
Anesthesiology and Critical Care Medicine, Université Laval,
Quebec City, QC, Canada

É. L. Belzile, MD
Division of Orthopedic Surgery, Department of Surgery, CHU
de Québec-Université Laval, Quebec City, QC, Canada

A. Richard-Denis, MD, MSc
Department of Medicine, Université de Montréal, Montreal,
Quebec, Canada

Results Our response rate was 47% (350/744), and 52% (181/350) of participants completed the entire survey. Most respondents (71%, 129/181) worked in teaching hospitals. Multimodal analgesia (93%, 240/257), nonsteroidal anti-inflammatory agents (77%, 198/257), and physical stimulation (75%, 193/257) were the strategies perceived to be the most frequently used. Several preventive strategies were perceived to be very effective by over 80% of respondents. Of these, some that were reported as not being frequently used were perceived to be among the most effective ones, including guidelines or protocols, assessing risk factors for opioid misuse, physical health follow-up by a professional, training for clinicians, patient education, and prescription monitoring systems. Staff shortages, time constraints, and organizational practices were identified as the main barriers to the implementation of the highest ranked preventive strategies.

Conclusions Several strategies to prevent long-term opioid therapy following trauma are perceived as being effective by those prescribing opioids in this population. Some of these strategies appear to be commonly used in everyday practice and others less so. Future research should focus on which preventive strategies should be given higher priority for implementation before assessing their effectiveness.

Résumé

Objectif Évaluer comment les cliniciens canadiens impliqués dans les soins aux patients traumatisés et prescrivant des opioïdes perçoivent l'utilisation et l'efficacité des stratégies visant à prévenir le traitement prolongé par opioïde après un traumatisme. Les obstacles

et facilitateurs de la mise en œuvre de ces stratégies ont aussi été analysés.

Méthodes Nous avons réalisé une enquête transversale via le Web. Les participants potentiels ont été identifiés par les gestionnaires et directeurs de programmes de traumatologie des départements ciblés dans trois provinces canadiennes. Nous avons conçu notre questionnaire en utilisant la méthodologie de recherche usuelle des enquêtes de santé. Le questionnaire a été administré entre avril 2021 et novembre 2021.

Résultats Notre taux de réponse a été de 47 % (350/744) et 52 % (181/350) des participants ont complété l'enquête dans sa totalité. La majorité des personnes interrogées (71 %, 129/181) travaillait dans des hôpitaux universitaires. L'analgesie multimodale (93 %, 240/257), les anti-inflammatoires non stéroïdiens (77 %, 198/257) et la stimulation physique (75 %, 193/257) étaient les stratégies perçues comme étant le plus fréquemment utilisées. Plusieurs stratégies préventives étaient perçues comme étant très efficaces par plus de 80 % des répondants. Parmi celles-ci, certaines étaient signalées comme n'étant pas utilisées très souvent, mais perçues comme étant les plus efficaces, notamment les lignes directrices et protocoles évaluant les facteurs de risque d'utilisation abusive des opioïdes, le suivi de la santé physique par un professionnel, la formation des cliniciens, l'éducation des patients et les systèmes de suivi des prescriptions. La pénurie de personnels, les contraintes de temps et les pratiques de l'établissement ont été identifiées comme étant les principaux obstacles à la mise en place des stratégies préventives classées parmi les premières.

Conclusions Plusieurs stratégies de prévention du traitement par opioïdes à long terme après un

Research Centre of the CIUSSS du Nord-de-l'île-de-Montréal, Montreal, QC, Canada

C. M. Dale, RN, PhD
Lawrence S. Bloomberg Faculty of Nursing, University of Toronto, Toronto, ON, Canada

University of Toronto Centre for the Study of Pain (UTCSP), Toronto, ON, Canada

G. Berry, MD, MEd
Department of Orthopaedic Surgery, McGill University Health Centre, Montreal, QC, Canada

M. Choinière, PhD · G. M. Pagé, PhD
Quebec Pain Research Network, Sherbrooke, QC, Canada

Research Center of the Centre hospitalier de l'Université de Montréal, Montreal, QC, Canada

Department of Anesthesiology and Pain Medicine, Faculty of Medicine, Université de Montréal, Montreal, QC, Canada

L. Guénette, BPharm, PhD
Population Health and Optimal Practices Research Unit
Research Unit (Trauma – Emergency–Critical Care Medicine),
CHU de Québec-Université Laval Research Centre, 1401, 18e
rue, Quebec City, QC G1V 1Z4, Canada

Quebec Pain Research Network, Sherbrooke, QC, Canada

Faculty of Pharmacy, Université Laval, Quebec City, QC,
Canada

S. Dupuis, BPharm, MSc
Department of Pharmacy, CIUSSS du Nord-de-l'île-de-
Montréal, Montreal, QC, Canada

L. Tremblay, MD, PhD
Department of Surgery, Sunnybrook Health Sciences Centre,
Toronto, ON, Canada

V. Turcotte, NP, MA
Department of Nursing, CIUSSS du Nord-de-l'île-de-Montréal,
Montreal, QC, Canada

traumatisme sont perçues comme efficaces par ceux qui les prescrivent à cette population de patients. Certaines de ces stratégies apparaissent comme couramment utilisées dans la pratique quotidienne et d'autres moins souvent. La recherche future devrait se concentrer sur la détermination des stratégies préventives auxquelles il faudrait accorder la plus grande priorité de mise en œuvre avant d'évaluer leur efficacité.

Keywords injuries · opioids · prevention · survey

Traumatic injuries and their surgical management often result in high-intensity pain,^{1–12} usually requiring opioids for pain relief.^{13, 14} Nevertheless, up to 20% of patients with traumatic injuries become long-term opioid users (\geq three months)^{15–19} and this percentage may climb to 60% in those with risk factors such as mental health problems, a history of substance use problems, or living with chronic pain.^{13, 17–21} These numbers are alarming considering that inappropriate long-term opioid use can lead to significant negative impacts. When compared with opioid-naïve patients, long-term opioid users experience more psychological distress, functional impairment, and have a poorer quality of life. Moreover, a large proportion of these patients do not achieve significant pain relief.^{16, 21–24} Long-term therapy can also lead to opioid use for reasons other than their medical purpose, regardless of the resulting adverse events reported in 30% of cases.^{25, 26} Opioid misuse can ultimately lead patients to illicitly purchase opioids or their derivatives,^{27–29} contributing to drug diversion, opioid-related overdoses, and death.^{30, 31}

Given these issues, strategies to prevent long-term opioid use in trauma patients while also providing adequate pain relief are needed. A recent scoping review identified strategies that may limit long-term opioid therapy.³² Nonsteroidal anti-inflammatory drugs

(NSAIDs), personalized opioid tapering protocols, educational strategies for patients and professionals, and multimodal and psychological strategies seem to have the greatest potential. Nevertheless, most of these strategies are supported by low-level evidence. Of note, very little is known about the practices and beliefs of many Canadian clinicians involved in the care trajectory of trauma patients (i.e., from acute care to community-based services) regarding preventive strategies. Gathering information on these issues could further our understanding of any gaps in practice and help guide future research. Therefore, the aim of our study was to evaluate the perceived use and effectiveness of strategies to prevent long-term opioid therapy following trauma, as well as the barriers and facilitators to their implementation.

Methods

We conducted a self-administered cross-sectional survey of Canadian clinicians involved in trauma patient care and overseeing opioid prescriptions. We followed a standardized approach for the design and conduct of surveys for clinicians.³³ Our practice survey is reported according to the Consensus-Based Checklist for Reporting of Survey Studies³⁴ (Electronic Supplementary Material [ESM] eAppendix 1). The study population consisted of physicians, nurse practitioners (NPs), and pharmacists. Our questionnaire is part of a comprehensive research program on the judicious use of opioids in trauma patients throughout their care trajectory. The study was approved by the Research Ethics Committee of the CHU de Québec-Université Laval (# 2021-5486, 2021).

Population and sample size

We targeted physicians, NPs, and pharmacists working in trauma centers admitting a significant number of trauma

M.-O. Martel, PhD
Quebec Pain Research Network, Sherbrooke, QC, Canada

Faculty of Medicine & Dentistry, McGill University, Montreal, QC, Canada

Claude-Édouard Chatillon, MD
Division of Neurosurgery, CIUSSS de la Mauricie-et-du-Centre-du-Québec, Trois-Rivières, QC, Canada

K. Perreault, PT, PhD
Quebec Pain Research Network, Sherbrooke, QC, Canada

Centre interdisciplinaire de recherche en réadaptation et intégration sociale (Cirris), CIUSSS de la Capitale-Nationale, Quebec City, QC, Canada

F. Lauzier, MD, MSc
Population Health and Optimal Practices Research Unit
Research Unit (Trauma – Emergency–Critical Care Medicine),
CHU de Québec-Université Laval Research Centre, 1401, 18e
rue, Quebec City, QC G1V 1Z4, Canada

Division of Critical Care Medicine, Department of
Anesthesiology and Critical Care Medicine, Université Laval,
Quebec City, QC, Canada

Department of Medicine, Université Laval, Quebec City, QC,
Canada

patients (level 1 and level 2),³⁵ trauma patient rehabilitation centers, and family medicine clinics. The study population was chosen to cover the entire care pathway during which interventions can be implemented to prevent long-term opioid use. We targeted clinicians from three Canadian provinces with low (Quebec) and high (Ontario and British Columbia [BC]) rates of opioid-related overdoses and deaths,³⁶ considering that these issues may be influenced by practices aimed at reducing long-term opioid use but also by public awareness. The list of trauma centers was provided by the Trauma Association of Canada (TAC) and provincial health ministries, and the list of rehabilitation centers from trauma program managers in the targeted provinces (ESM eAppendix 2). To improve feasibility and because of the difficulties involved when trying to reach all the clinicians working in medical clinics, which are not integrated into any organized Canadian trauma systems, we only targeted clinics affiliated to the Quebec Practice-Based Research Network. These include six Quebec urban and rural administrative regions.³⁷ The Quebec Practice-Based Research Network was created to strengthen the capacity for primary care research by facilitating the recruitment of primary healthcare professionals.³⁷ Hence, clinicians working in medical clinics in Ontario and BC were not targeted. Clinicians were invited to complete the survey if they were regularly prescribing or deprescribing opioids in trauma patients. The latter were defined in the introductory message of the survey as patients with major or minor injuries. Based on the number of clinicians in the targeted centers and family medicine clinics, the *a priori* estimate for the total number of potential respondents was 1,000. Based on a 95% confidence level with a maximum 5% margin of error for a specific proportion (percentage), a minimum of 300 respondents were needed. This is consistent with previous studies conducted in similar populations.^{38–40}

Survey design

We used a modified Delphi approach to guide the study steering committee (i.e., researchers with expertise in survey design and pain management, physicians, NPs, pharmacists, patient partners) in the selection of survey domains and questions.³³ During this process, various domains and items were generated and then narrowed down or reformulated to include only those considered most relevant to address the study objectives. The questionnaire included four main question categories: 1) how clinicians evaluate their use of strategies to prevent long-term opioid therapy according to organizational, multimodal, and educational domains; 2) clinicians' views on the effectiveness of these strategies according

to the same domains; 3) identification and ranking of the 10 strategies considered most effective; and 4) perceived barriers and facilitators to the implementation of the strategies considered as most effective according to the Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) Evidence to Decision framework.⁴¹ We used five-point Likert scales for questions on the perceived use and effectiveness, and a 0–10 ranking scale to determine priority. The estimated proportion of patients at long-term risk of opioid use treated by the respondents was also collected. The questionnaire was initially designed in French and translated to English using a double forward–backward method in collaboration with a language specialist.⁴² The French and English versions of the questionnaire are available in ESM eAppendix 3 and 4, respectively.

Survey pretesting

An interdisciplinary team of clinicians treating trauma patients and directly involved in pain management (physicians, nurses, pharmacists), and experts in practice survey methodology pretested the French and English surveys for relevance, content validity, clarity, comprehensiveness, and redundancy. After adjusting the wording and order of some of the questions (perceived use and effectiveness), the questionnaire was pretested in trainees (12 medical residents, NP students, and pharmacy residents) to assess its clarity, format, and ease of use. This led to further clarification of a few items. Although initially planned, the test-retest reliability assessment could not be completed due to the third wave of the COVID-19 pandemic.

Survey administration

Potential respondents were identified by trauma program medical directors/managers and the heads of the orthopedic, neurosurgery, and physiatry (physical medicine and rehabilitation) departments. These stakeholders were identified using the TAC and the websites of the targeted organizations. The survey was distributed by email to the identified stakeholders. The Quebec Practice-Based Research Network was in charge of contacting clinicians in family medicine clinics. The emails held a link to the web format of the French or English survey created with LimeSurvey (LimeSurvey GmbH, Hamburg, Germany). Participants who completed the questionnaire only partially received an automated message in their mailbox with an invitation to finish the survey. Potential respondents were sent reminders two, four, and eight weeks after the initial invitation. Survey participants did not receive any financial compensation for

taking part in this survey but CAD 10 was allocated to United Way Centraide Canada for each completed questionnaire. This nonprofit organization helps meet the basic needs of the most vulnerable populations in Canada.⁴³

Data analysis

We analyzed the questionnaires according to question categories. Therefore, data were included in the analysis when 100% of the questions were completed for each category.⁴⁴ Survey answers are reported as counts and percentages. IBM SPSS Statistics for Windows, Version 28.0 (IBM Corp., Armonk, NY, USA) was used for data analyses. After consultation with the steering committee, we classified barriers and facilitators to the implementation of strategies as very important when identified by at least 30% of respondents, important when identified by 10–29% of respondents, and as unimportant when identified by less than 10% of respondents. We estimated that when 30% or more of participants identified a barrier, it had the potential to significantly impede strategy implementation, whereas the identification of a facilitator by 30% or more significantly increased the possibility of implementing the strategy. Descriptive analyses were computed all together and then stratified by province and by respondent's practice setting, profession, gender, work setting, and whether they estimated that a significant proportion ($\geq 30\%$) of their patients were at risk of long-term opioid therapy. There was no stratification of barriers and facilitators given the limited number of answers provided and the fact that respondents' answers were very similar. Subgroup analyses were performed only to assess trends in differences—i.e., no tests of statistical significance were performed considering that the study was not sufficiently powered to accurately assess differences between groups.

Results

Respondents

We contacted 776 potential respondents between April 2021 and November 2021. Among these, 32 did not meet the inclusion criteria and were excluded. The response rate was 47% (350/744), of which 73% (257/350) answered more than one question and 52% (181/350) completed the entire survey (Fig. 1). The lowest response rates were for questions on barriers and facilitators (186/350) and sociodemographic data (181/350). Given the significant changes in the work organization of the family medicine clinics during the COVID-19 pandemic, it was not possible for the Quebec Practice-Based Research Network to

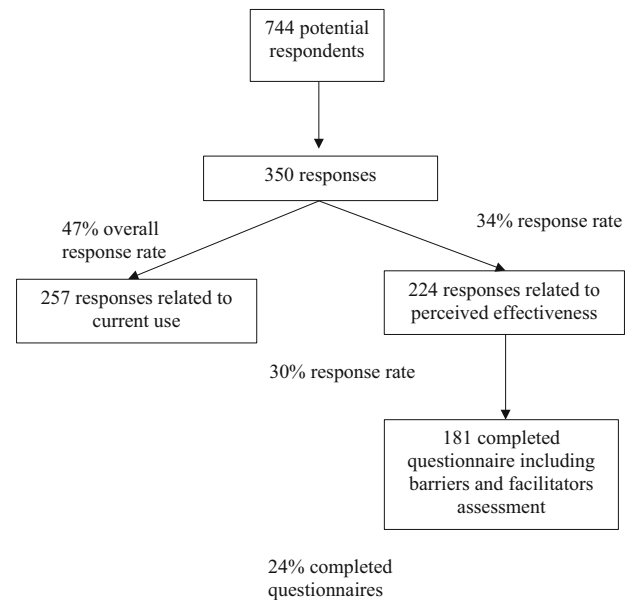


Fig. 1 Flow diagram of participants

distribute the survey to potential respondents in these clinics as planned. Consequently, clinicians working in the community were only represented if they were involved in the outpatient rehabilitation or patient recovery phases.

Among respondents, 77% (140/181) worked in the province of Quebec, 12% (23/181) in BC, and 10% (18/181) in Ontario (Table 1). The majority (71%, 129/181) worked in teaching hospitals and practiced as medical specialists (62%, 113/181), including surgeons and physiatrists. Nearly half (48%, 87/181) of respondents reported caring for over 100 trauma patients yearly, while more than two-thirds (68%, 240/350) reported seeing less than 30% of patients estimated at risk of long-term opioid use.

Perceived use of preventive strategies

Figure 2 shows the results on the perceived use of preventive strategies. Respondents reported that the following preventive strategies were the most frequently applied (i.e., often to always) in clinical practice: (93%, 240/257), NSAIDs (77%, 198/257), physical stimulation including physical therapy, exercise programs and/or setting goals for a return to activities of daily living (75%, 193/257), downward adjustment of opioid consumption based on patient's recovery (70%, 181/257), and cryotherapy (61%, 157/257). Pharmacists perceived that the following strategies were applied less frequently: NSAIDs (often to always: 46%, 12/23), physical stimulation (61%, 14/23), downward adjustment of opioid consumption based on patient's recovery (57%, 13/23), and cryotherapy (30%, 7/23) (ESM eAppendix 5).

Table 1 Sociodemographic data of respondents

Characteristic	Data, n/total N (%)*
Age (yr)	
20–29	25/181 (14%)
30–39	62/181 (34%)
40–49	57/181 (32%)
50–59	22/181 (12%)
≥ 60	15/181 (8%)
Gender	
Male	101/181 (56%)
Female	78/181 (43%)
Nonbinary	2/181 (1%)
Province	
Quebec	140/181 (77%)
British Columbia	23/181 (13%)
Ontario	18/181 (10%)
Employment title	
Specialist physician	113/181 (62%)
General surgeon	27/181 (28%)
Orthopedic surgeon	44/181 (45%)
Neurosurgeon	7/181 (9%)
Physiatrist	18/181 (18%)
Anesthesiologist	2/181 (2%)
General practitioner	12/181 (7%)
Adult nurse practitioner	8/181 (4%)
Primary care nurse practitioner	25/181 (14%)
Pharmacist	23/181 (13%)
Number of years of practice	
< 1	19/181 (11%)
1–5	47/181 (26%)
6–10	42/181 (23%)
11–20	41/181 (23%)
> 20	32/181 (18%)
Number of patients treated per year	
< 20	22/181 (12%)
20–50	31/181 (17%)
51–100	41/181 (23%)
101–200	28/181 (16%)
> 200	59/181 (33%)
Practice setting	
Academic hospital	129/181 (71%)
Nonacademic hospital	8/181 (4%)
Inpatient rehabilitation center	7/181 (4%)
Outpatient rehabilitation—recovery support	37/181 (21%)

Data were calculated according to complete responses to sociodemographic questions

Gabapentinoids for neuropathic pain were reported as more often used by those involved in the rehabilitation phase, and by NPs and pharmacists (often to always $\geq 80\%$ vs

$< 60\%$ for the other subgroups). There were no major differences in the strategies perceived to be the most often used based on the province where clinicians practiced.

The strategies reported as being the least commonly used were cannabinoids (5%, 14/257); alternative pain management strategies such as acupuncture (5%, 13/257); massage therapy (11%, 27/257); transcutaneous electrical nerve stimulation (TENS) (12%, 31/257); mental health approaches for pain management (13%, 33/257); professional follow-up in mental health to guide patients in the gradual reduction of opioid use (9%, 24/257); and pre-established communication mechanisms between professionals outside the practice setting to optimize the follow-up of patients using opioids (10%, 26/257). Respondents from Quebec reported using prescription monitoring systems less frequently than those from BC and Ontario (17%, 23/140 vs 44%, 15/41) (ESM eAppendix 5).

Perceived effectiveness of preventive strategies

Figure 3 shows the results on the perceived effectiveness of the strategies. Three quarters of preventive strategies (16/22) were perceived as being very effective (probably effective to definitely effective) by over 80% ($> 180/224$) of respondents. Strategies perceived as less effective were adjuvant analgesic treatments such as cannabinoids, and alternative therapies such as TENS, massage, and acupuncture. Except for cannabinoids, at least 80% of respondents involved in the rehabilitation phase of trauma patients perceived the latter strategies as very effective. There were no important differences in the strategies perceived as most or least effective according to geographical location (ESM eAppendix 6). Of all the potential strategies, the ten ranked as most likely to be effective (Table 2) were as follows: 1) multimodal analgesia (92%, 186/203); 2) guidelines or protocols about judicious opioid prescribing (69%, 140/203); 3) downward adjustment of opioid consumption based on patient's recovery (68%, 138/203); 4) assessment of risk factors for opioid misuse (68%, 137/203); 5) systematic limitation of the amount of opioids prescribed (65%, 131/203); 6) follow-up by a professional in physical health (e.g., physician, NP, pharmacist) (62%, 125/203); 7) physical stimulation (58%, 118/203); 8) training offered to professionals (58%, 118/203); 9) standardized educational intervention for patients about the proper use of opioids (55%, 112/203); and 10) prescription monitoring systems (51%, 104/203). Respondents from BC and Ontario included NSAIDs and pre-established communication mechanisms between professionals outside the practice setting among the ten strategies most likely to be effective (rank 4: 59%, 24/44 and rank 10:

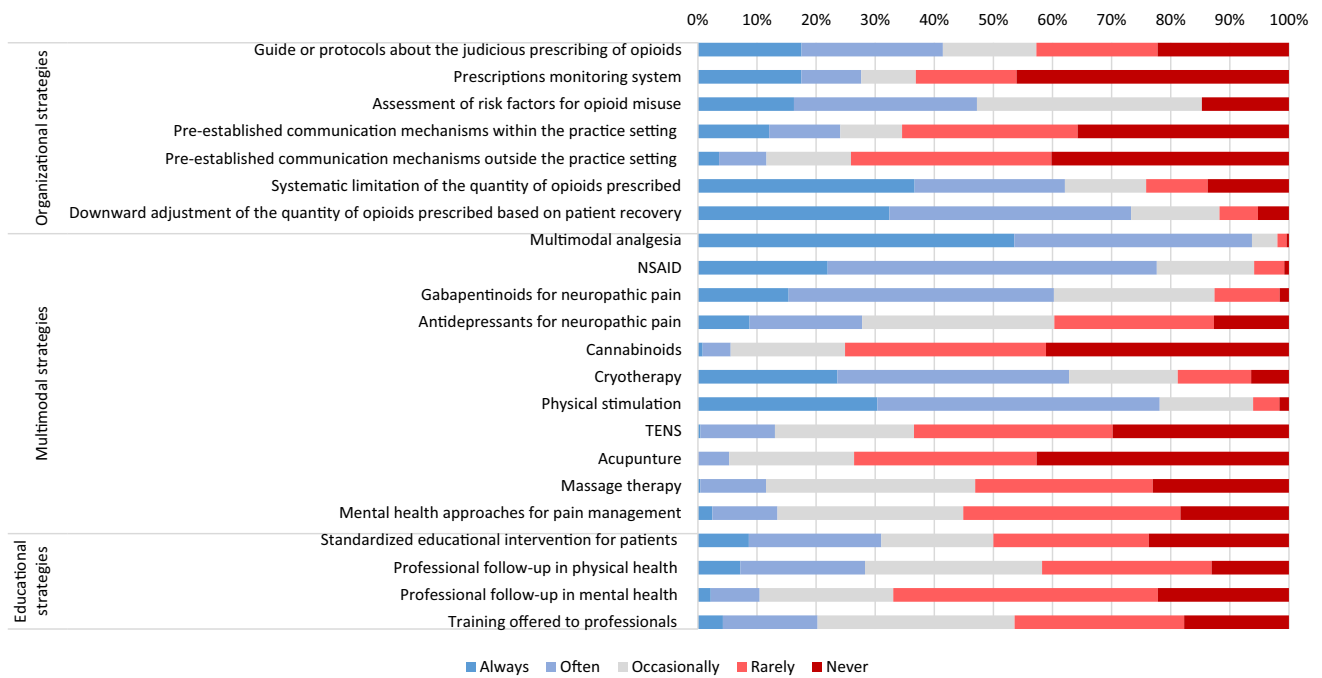


Fig. 2 Perceived use of preventive strategies

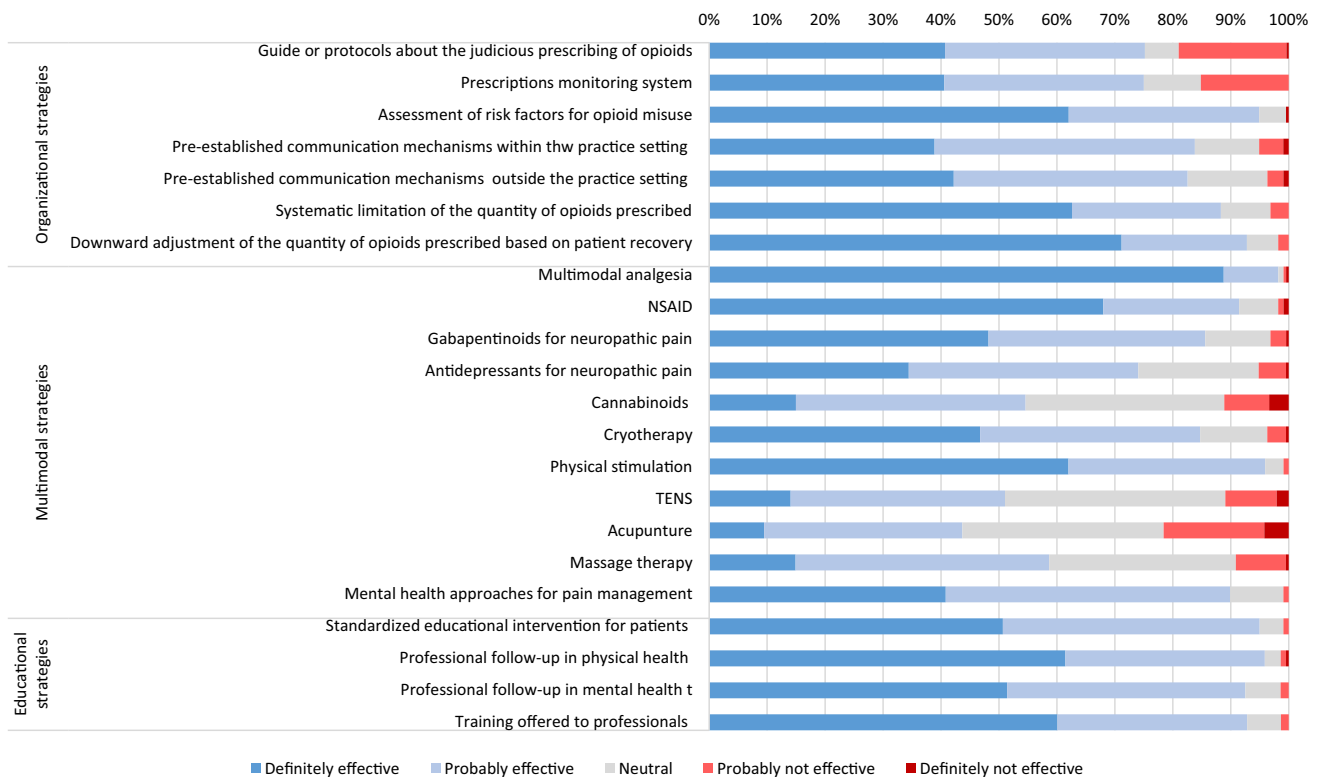


Fig. 3 Perceived effectiveness of preventive strategies

Table 2 Ranks of preventive strategies according to their perceived effectiveness

Strategies	Number of votes as the top strategies to be prioritized, <i>n</i> /total <i>N</i> (%)	Rank based on the number of votes
Guide or protocols about the judicious prescribing of opioids	140/203 (69%)	2
Prescriptions monitoring system	104/203 (51%)	10
Assessment of risk factors for opioid misuse	137/203 (68%)	4
Pre-established communication mechanisms between professionals within your practice setting to optimize the follow-up of patients using opioids	86/203 (42%)	13
Pre-established communication mechanisms between professionals outside your practice setting to optimize the follow-up of patients using opioids	74/203 (37%)	15
Systematic limitation of the quantity of opioids prescribed	131/203 (65%)	5
Downward adjustment of the quantity of opioids prescribed based on patient recovery	138/203 (68%)	3
Multimodal analgesia	186/203 (92%)	1
NSAIDs	92/203 (45%)	12
Gabapentinoids for neuropathic pain	68/203 (34%)	16
Antidepressants for neuropathic pain	46/203 (23%)	17
Cannabinoids for pain management	16/203 (8%)	19
Cryotherapy	46/203 (23%)	17
Physical stimulation	118/203 (58%)	7
TENS	12/203 (6%)	20
Acupuncture	9/203 (4%)	21
Massage therapy	17/203 (8%)	18
Mental health approaches to pain management	99/203 (49%)	11
Standardized educational intervention for patients about the risk and proper use of opioids	112/203 (55%)	8
Professional follow-up in physical health to guide patients in the gradual reduction of opioid use	125/203 (62%)	6
Professional follow-up in mental health to guide patients in the gradual reduction of opioid use	79/203 (39%)	14
Training offered to professionals on the risks of opioids and how to prescribe them	118/203 (58%)	7

NSAIDs = nonsteroidal anti-inflammatory drugs; TENS = transcutaneous electrical nerve stimulation

34%, 14/41) (ESM eAppendix 6). The same was true for pre-established communication mechanisms between professionals outside the practice setting for NPs and pharmacists (rank 6: 57%, 13/23; and rank 9: 39%, 9/23) and for those treating a large proportion of patients at risk of long-term therapy (rank 9: 58%, 118/203).

Perceived barriers and facilitators

Figures 4 and 5 illustrate the barriers and facilitators to the ten strategies identified as most likely to be effective. Staff shortages and time constraints were identified as barriers by more than one-third of respondents with respect to the following strategies: assessment of risk factors for opioid misuse (30% and 48%, respectively); physical health follow-up by a professional (75% and 49%); physical stimulation (51% and 27%); training offered to

professionals (33% and 64%); standardized educational intervention for patients (51% and 47%); and prescription monitoring systems (44% and 31%) (Fig. 4). Organizational practices were also reported as a barrier by a similar proportion of respondents for all these strategies, with the exception of risk factor assessment for opioid misuse and physical stimulation, which were selected by fewer respondents. With respect to facilitators, one-third or more of respondents agreed that multimodal analgesia (52%), guidelines or protocols about judicious opioid prescribing (36%), and training offered to professionals (32%) are associated with a high level of evidence. The same was true regarding the safety of multimodal analgesia (30%), downward adjustment of opioid consumption based on patient's recovery (36%), systematic limitation of opioids prescribed (32%), and prescription monitoring systems (30%) (Fig. 5).

Strategy	Low level of evidence	Availability of human resources	Time needed	Organizational practices	Poor safety	High costs	Poor adherence from patients
Multimodal analgesia	●	●	●	●	●	●	●
Guide or protocols about the judicious prescribing of opioids	●	●	●	●	●	●	●
Downward adjustment of the amount of opioids based on patient recovery	●	●	●	●	●	●	●
Assessment of risk factors for opioid misuse	●	●	●	●	●	●	●
Systematic limitation of the amount of opioids prescribed	●	●	●	●	●	●	●
Professional follow-up in physical health	●	●	●	●	●	●	●
Physical stimulation	●	●	●	●	●	●	●
Training offered to professionals on the risks of opioids and how to prescribe them	●	●	●	●	●	●	●
Standardized educational intervention for patients about the proper use of opioids	●	●	●	●	●	●	●
Prescription monitoring system	●	●	●	●	●	●	●

Red: barrier identified by >30%; Yellow: barrier identified by 10 to 29%; Green: barrier identified by <10%

Fig. 4 Barriers to implementing the strategies considered most effective

Strategy	High level of evidence	Availability of human resources	Time needed	Organizational practices	High safety	Low costs	Good adherence from patients
Multimodal analgesia	●	●	●	●	●	●	●
Guide or protocols about the judicious prescribing of opioids	●	●	●	●	●	●	●
Downward adjustment of the amount of opioids based on patient recovery	●	●	●	●	●	●	●
Assessment of risk factors for opioid misuse	●	●	●	●	●	●	●
Systematic limitation of the amount of opioids prescribed	●	●	●	●	●	●	●
Professional follow-up in physical health	●	●	●	●	●	●	●
Physical stimulation	●	●	●	●	●	●	●
Training offered to professionals on the risks of opioids and how to prescribe them	●	●	●	●	●	●	●
Standardized educational intervention for patients about the proper use of opioids	●	●	●	●	●	●	●
Prescription monitoring system	●	●	●	●	●	●	●

Red: facilitators identified by < 10%; Yellow : facilitator identified by 10 to 29%; Green: facilitator identified by > 30%

Fig. 5 Facilitators to implementing the strategies considered most effective

Discussion

Our survey of Canadian clinicians involved in trauma patient care gives an overview of perceived practices to prevent long-term opioid use in traumatic injury patients for three Canadian provinces. Several of these strategies, which are readily accessible and easy to implement, were reported to be the most often used during the care pathway. Nevertheless, among the strategies perceived as being the

most effective, some were identified as not often used. Resources, time, and organizational practices were mentioned as the main barriers to the use of these prevention strategies. Which stage of the recovery pathway the respondents were involved in and their role in pharmacological and patient follow-up influenced the perceived use and effectiveness of the different strategies. The same was true for the province where the clinicians worked, with those from Ontario and BC promoting

strategies related to communication mechanisms between care settings about patients' opioid use more than their Quebec counterparts. In addition to seeing more patients with substance use disorders, these clinicians may have integrated these strategies more effectively into their practice, given the many government initiatives to limit the opioid crisis in these provinces.^{45–48}

To date, most healthcare professional surveys about opioid use have focused on prescribing practices, attitudes, and knowledge.^{49–66} Thus, our survey provides a new perspective in terms of what key stakeholders perceive as important to optimize practices in the prevention of long-term opioid therapy. Many of the strategies perceived to be frequently used and most effective are those associated with significant decreases in opioid long-term use following trauma or recommended in several practice guidelines, as shown in a recent scoping review.³² These include multimodal analgesia, guidelines and protocols, training for clinicians, educational strategies for patients with or without support for opioid tapering, and prescription monitoring systems. Guidelines and education are strategies fostering knowledge, decision processes, awareness of consequences and reinforcement, which are the underpinnings of the capacity and motivation to adopt the desired behavior,⁶⁷ including those aimed at alleviating pain and reducing opioid use. Nevertheless, although a recent survey found that 70% of respondents changed their practice to meet guideline recommendations for opioid therapy in the context of chronic pain,⁶⁸ mixed findings have been reported on practice guidelines to promote the adoption of best practices. Some studies showed favorable outcomes, while others reported only limited effects.^{69–71} In this regard, various strategies to promote high-quality clinical practice guideline implementation and dissemination have been evaluated. The most consistently effective are educational interventions, clinical reminders, and supportive organizational culture (e.g., organizations and teamwork that facilitate the implementation of best practices and lead opinions).⁷¹

Two preventive strategies rated as likely to be highly effective following traumatic injury by our survey respondents—i.e., physical stimulation and establishing communication mechanisms between professionals to optimize the follow-up of patients using opioids—have been studied little to date.³² Rehabilitation strategies, including physical therapy, have been associated with reduced opioid use in patients with chronic noncancer pain when integrated into multimodal approaches, but studies on their effect as a stand-alone treatment are still limited.⁷² Nevertheless, a systematic review of studies, mostly in primary care, showed that interprofessional collaboration was a promising strategy to improve appropriate opioid use

and reduce opioid use disorder.⁷³ Having a tool to identify patients at high risk for opioid misuse could potentially facilitate communication mechanisms between professionals regarding patients requiring increased monitoring or support in opioid tapering. Nevertheless, very few validated and reliable tools to identify the risk of nonjudicious opioid use in the general population, such as the Alcohol, Smoking and Substance Involvement Screening Test⁷⁴ and the Opioid Risk Tool,^{75, 76} have been proposed for trauma. In a recent study on injured patient screening for opioid misuse, the combination of post-traumatic syndrome distress-related symptoms, impaired pain coping, poor social support, and hospitalization > six days were found to be associated with a very good discriminative ability to predict opioid misuse and addiction.⁷⁷ Hence, these predictors could potentially guide risk assessment among trauma patients.

Strengths and limitations

Our survey was informed by the latest evidence and was rigorously developed following standardized methods. Although not optimal, our response rate was good compared with surveys of similar populations. Nonetheless, certain limitations must also be acknowledged. During the questionnaire design phase, we were unable to conduct the planned test-retest evaluation. Nevertheless, we performed content and construct validity assessments, making it possible to undertake comprehensive adjustments. It is also possible that survey answers were influenced by clinicians' exposure to patients with different risk levels of long-term opioid use. Nevertheless, except for the need to improve communication across practice settings for patients at greater risk of long-term use, stratification by estimated risk did not show significant differences in responses. Furthermore, the low response rate, particularly from Ontario and BC clinicians, may have impacted the reliability of the data. Indeed, our findings may be more representative of clinicians from Quebec since they represented close to 80% of the respondents. Nevertheless, subgroup analyses identified some important differences between provinces. Finally, clinicians involved with trauma patients in the community were under-represented in our study.

Conclusions

Our survey provides information on how clinicians involved in the different steps of the care pathway perceive practices regarding the prevention of long-term opioid therapy after traumatic injury. The most promising

strategies aim to guide healthcare professionals and patients in the use of opioids and pain management approaches and to optimize communication and follow-up mechanisms to support higher-risk patients in tapering off opioids over time. Future research should focus on identifying the strategies that should be prioritized for implementation by trauma stakeholders (i.e., interdisciplinary team members, patient partners, and decision makers) and further evaluation of their effectiveness in trauma care systems.

Author contributions *Mélanie Bérubé* secured funding for the project was responsible for conception and design and did most of the data analysis and interpretation. She drafted the manuscript, and revised it multiple times. *Caroline Côté* contributed to the survey design, pretesting, and administration as well as to data analysis. *Lynne Moore* contributed to the survey design, data analysis, and data interpretation. *Alexis F. Turgeon* oversaw the survey design, data analysis, and data interpretation. *Étienne L. Belzile, Andréane Richard-Denis, Craig M. Dale, and Gregory Berry* contributed to the survey design and administration, and data interpretation. *Manon Choinière and Gabrielle M. Pagé* contributed to the survey design and pretesting. *Line Guénette, Sébastien Dupuis, and Lorraine Tremblay* contributed to the survey design and administration. *Valérie Turcotte* contributed to the survey pretesting and administration. *Marc-Olivier Martel* contributed to the survey design and data interpretation. *Kadija Perreault* contributed to the survey design and administration. *Claude-Edouard Chatillon* contributed to the survey administration and data interpretation. *François Lauzier* helped draft the survey and contributed to its pretesting, data analysis, and data interpretation. All authors critically revised the manuscript and agreed to act as guarantors of the work.

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