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Effect of hand versus electronic signatures on response rates in postal surveys: a randomised controlled trial among emergency physicians in Canada

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ABSTRACT

Objectives Hand signatures offer a more authentic personalisation, which carries over to a sense of trust, although are costly and time-consuming when considering large postal surveys. The objective of this study was to compare response rates when using either hand-signed or electronic-signed letters in a postal survey.

Design and setting We embedded this randomised controlled trial within a national cross-sectional postal survey of emergency physicians in Canada. The survey aimed to describe current practice patterns with respect to primary headache disorders.

Participants We randomly sampled 500 emergency physicians listed in the Scott's Canadian Medical Directory, 2019 edition.

Interventions Using computer-generated random numbers, physicians were allocated to receiving either hand-signed (n=250) or electronic signed (n=250) letters. The initial mailout contained a US$5 Tim Hortons coffee card with the invitation letter. Four reminders were sent to non-responders every 3 weeks. The same type of signature was used for the initial invitation and subsequent reminders.

Outcome The primary outcome was the survey response rate.

Results Among 500 physicians invited, 32 invitations were undeliverable. Among the remaining 468 physicians, 231 had been allocated to the hand-signed group and 237 to the electronic signed group. The response rate in the hand-signed group was 87 (37.7%) vs 97 (40.9%) in the electronic-signed group (absolute difference in proportions −3.3%, 95% CI −12.1% to 5.6%).

Conclusion There was no significant difference in physician response rate between hand-signed and e-signed cover letter and reminder letters. Electronic signatures should be used in future postal surveys among physicians to save on time and labour without impacting response rates.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Our survey methodology used a modified Dillman's tailored design with additional steps to enhance response rates, such as incentives and removal of prenotification letters.
⇒ The survey questionnaire underwent rigorous testing prior to distribution using cognitive interviews on emergency physicians.
⇒ The survey was pilot tested to local addresses to ensure no issues with our postal procedure.
⇒ We obtained a relatively modest response rate, which may be attributed to the COVID-19 pandemic.

INTRODUCTION

Background

Physician surveys are often used to obtain information about their perspectives and attitudes towards clinical problems. A major challenge with physician surveys is obtaining an adequate response rate. Postal surveys typically have a higher response rate (up to 20% higher) compared with other modes of administration such as internet-based surveys, but are more costly and labour intensive.[1 2] There is evidence to suggest that physician response rates have been declining with time.[1 3] Among the reasons for declining response rates are lack of time during core working hours and gatekeepers such as receptionists who may perceive the survey as irrelevant and prevent it from reaching the recipient.[1] Exploring avenues to optimise response rates with respect to labour and cost is important.

The Dillman's Tailored Design Method provides recommendations on the optimal construction of surveys using various modes of administration.[4] These methods are well established in the literature and have shown response rates ranging from 50% to 65% when used as stand-alone mode of survey administration.[4] Methods for optimising postal surveys are continuously being explored to lower expenses and reduce labour. In our experience, the costs and labour involved in a postal survey include (1) printing large amounts of paper for the survey instrument and supporting documentation; (2) costs

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associated with printing and purchasing envelopes; (3) costs associated with prestamping the prepaid envelopes for each contact and sending the overall package; (4) folding printed materials into thirds and inserting into envelopes; (5) manual data entry and (6) hand signing of recruitment and reminder letters.

The effects of personalisation on response rates has been previously explored: insertion of name and address and blue ink signatures in each letter compared with mass-copied letters with group salutations improved response rates from 3% to 12% for the general population.[5] It is unclear if these findings hold true in a specialised population of physicians. Although it is more labour intensive to hand-sign masses of letters for each contact point, hand signatures have a more attractive visual appeal, offer a more personalised effect and carry over to a sense of trust which may contribute to a higher response rate.[6] On the other hand, if hand-signed letters show no significantly higher response rate than electronically signed (e-signed) letters, this would be useful information and could reduce time and labour in future postal survey administration.

Objectives

The primary objective of this randomised trial embedded within a large national postal survey was to determine if hand-signed letters resulted in a higher response rate compared with e-signed letters among Canadian emergency physicians.

We previously found some differences in response rates between Canadian French-speaking and English-speaking participants.[7] We; therefore, conducted a post hoc exploratory subgroup analyses to compare the effect of e-signatures versus hand signatures between English-speaking and Canadian French-speaking participants.

METHODS

Study design and participants

We used a national self-administered postal survey of emergency physicians listed in the 2019 Scott's Canadian Medical Directory, which is Canada's leading source for contact information and claims to list over 98% of practising physicians with 97% address accuracy.[8] The results from the survey are reported elsewhere.[7] The survey (online supplemental appendix A) was mailed to a random sample of 500 physicians. Physicians were eligible for the survey if they were currently treating adults in emergency medicine. The questionnaire was two pages in length and consisted of 12 questions which took approximately 10 min to complete. The survey addressed emergency physicians' current practice for treating benign headache disorders in the emergency department and their perspectives and attitudes towards peripheral nerve blocks (PNBs). PNBs are minor bedside procedures which are sometimes used to treat primary headache disorders in the emergency department. The survey questionnaire underwent rigorous development, using cognitive interviews, on 10 practising emergency physicians in English and Canadian French. The interviewer directly observed physicians complete the survey as they read questions aloud and identified any verbal and non-verbal cues which signified confusion or hesitation. The survey was adjusted after each iteration with respect to the content, organisation, grammar and overall layout to arrive at a finalised survey questionnaire.

Patient and public involvement

Neither patients nor the general public were involved in any formal way with this study.

Intervention

Using computer-generated numbers in Microsoft Excel (Redmond, Washington, USA), the principal investigator randomly assigned half (n=250) of our random sample of 500 emergency physicians to receive hand-signed letters and the remaining half to receive e-signed letters. The letters at each mailout (initial mailout and reminders 1–4) were all either hand-signed or e-signed depending on each emergency physicians assigned group. In the hand-signature group, the same two investigators (DP and JJP) signed each letter in blue ink above printed names, credentials and affiliations. In the e-signed group, scanned electronic signatures (in black ink) of DP and JJP were placed above printed name, credentials and affiliations at the bottom of each letter (online supplemental appendix B).

Outcome measure

The primary outcome was the response rate, where a response was considered any physician who returned a partially or fully completed questionnaire. The denominator was considered all successfully delivered surveys (ie, the number invited minus those returned undeliverable).

Survey administration

The survey was administered according to a modified Dillman's method, including an initial mailout with an unconditional US$5 Tim Horton's coffee card, either a hand-signed or e-signed recruitment letter, the survey instrument, an information sheet and a postage-paid envelope. We used four reminders sent every 3 weeks to non-responders with either hand-signed or e-signed reminder letters stating the number of weeks it has been since the last letter with a new survey instrument and a prepaid return envelope. The final reminder was sent using Canada Post Xpresspost, which guarantees delivery within 1–3 business days and is larger and more visually appealing in appearance. Surveys were administered in English or Canadian French according to recipients' language preference as reported by the Canadian Medical Directory. Prior to sending the initial mailout, we pilot tested (n=20) our survey to local addresses in June 2021 to ensure no issues with our postal procedure. The initial mailout (n=480) was sent in July 2021 and the last contact was made in October 2021. We used additional measures in attempt to resend undeliverable letters by searching the physician in the College of Physicians and Surgeons

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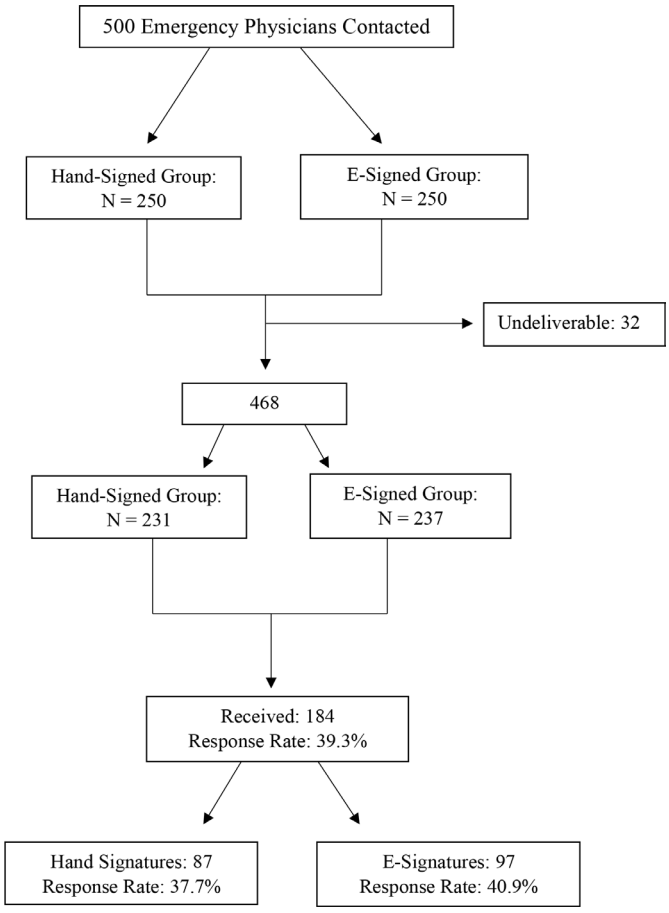

Figure 1 Participants and response rate in hand-signature group versus electronic-signature group.

of Ontario (or equivalent for the respective jurisdiction) for an updated primary practice location (online supplemental appendix C).

Sample size rationale

This trial was embedded within an existing survey and the sample size was therefore predetermined by the objectives of the survey. We, therefore, calculated the detectable difference given the available sample size, which was sufficient to detect an absolute difference between the hand-signed and e-signed groups response rates of 13% with 80% power, assuming a response rate of 50% in the e-signed group and using a two-sided test at the 5% level of significance. Previous surveys using similar methods have achieved response rates around 50%.[9–11]

Data analysis

Data from returned survey questionnaires were manually entered into Microsoft Excel (Redmond, Washington, USA). We assessed differences between respondents and non-respondents in geographical practice location in Canada and language preference using χ^2 tests. We used a χ^2 test to compare the response rates in the hand-signature and e-signed groups together with absolute and relative difference in proportions and a two-sided 95% CI. All data analyses were conducted using Microsoft Excel (Redmond, Washington, USAs) and SAS V.9.2 (SAS Institute).

For the exploratory subgroup analysis, we stratified results by language and obtained absolute differences in proportions. We also tested for a significant interaction effect using logistic regression.

RESULTS

Response rate

Figure 1 demonstrates the flow diagram for our study. We launched the survey in June 2021 and collected final responses in January 2022. From the 2955 emergency physicians listed in threvision of the funding policy, having modelse Canadian Medical Directory, we randomly selected 500 and assigned n=250 into each of the hand-signed and e-signed groups. Thirty-two surveys were returned undeliverable due to change in practice location, retired or other reasons. Of 468 delivered surveys (231 in the hand-signed and 237 in the e-signed group), we received 184 responses for an overall response rate of 39.3%. The response rate in the hand-signed group was 87 (37.7%) compared with 97 (40.9%) in the e-signed group (absolute difference in proportions −3.3%. 95% CI −12.1% to 5.6%, relative difference: 0.92, 95% CI 0.73 to 1.15).

Respondent characteristics

Table 1 displays respondent demographics in the hand-signed and e-signed groups. Physician demographics were similar between the hand-signature and e-signed group. The majority of the respondents were male (65.5%), in practice for 10 or more years (78.4%) and had a Canadian College of Family Physicians with specialisation in Emergency Medicine designation (51.9%). Most emergency physicians practised in Ontario (40.8%), Western Canada (31.5%) and Quebec (19.6%) and in an academic health centre or community/district teaching hospital (83.1%), which accommodates 60 000 or more emergency department visits per year (56.8%).

For the exploratory subgroup analysis comparing effect of the type of signatures between English-speaking and Canadian French-speaking participants (table 2), the response rate among English-language participants was 72/201 (35.8%) in the hand-signed group compared with 80/200 (40%) in the e-signed group (absolute difference: −4.2%, 95% CI −13.7% to 5.6%). Among Canadian French-speaking participants, the response rate was 15/31 (48.4%) in the hand-signed group compared with 17/36 (47.2%) in the e-signed group (absolute difference: 1.2%, 95% CI −22.8% to 25.2%); p value for statistical interaction p=0.68.

DISCUSSION

Our randomised controlled trial embedded within a national postal survey was unable to demonstrate that hand-signatures have a higher response rate than e-signatures.

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Table 1 Demographics and practice setting among hand-signature and electronic-signature groups and eligible emergency physicians

Characteristic¶	Hand-signature N (%)	Electronic-signature N (%)
Gender	N=70	N=78
Female	27 (38.6)	23 (29.5)
Male	43 (61.4)	54 (69.2)
Other	0 (0)	0 (0)
Prefer not to say	0 (0)	1 (1.3)
Language*	N=87	N=97
English	72 (82.8)	80 (82.4)
Canadian French	15 (17.2)	17 (17.5)
Years of practice	n=70	n=78
1–4	3 (4.3)	2 (2.6)
5–9	12 (17.1)	12 (15.4)
10–19	26 (37.1)	31 (39.7)
≥20	26 (41.4)	33 (42.3)
Region†	n=87	n=97
Western Canada	23 (26.4)	35 (36.1)
Ontario	35 (40.2)	40 (41.2)
Quebec	19 (21.8)	17 (17.5)
Eastern Canada	10 (11.5)	5 (5.2)
Canadian professional designation‡	n=60	n=69
CCFP	1 (1.7)	1 (1.4)
CCFP-EM	32 (53.3)	35 (50.7)
FRCPC-EM	14 (23.3)	18 (26.1)
Multiple§	13 (21.7)	12 (17.4)
Other	0 (0)	3 (4.3)
Practice setting	n=62	n=68
Academic health centre	21 (33.8.)	20 (29.4)
Community/district general hospital: teaching	30 (48.4)	37 (54.4)
Community/district general hospital: non-teaching	9 (14.5)	8 (11.7)
Rural	2 (3.2)	3 (4.4)
Other	0 (0)	1 (1.5)
Patient visits to ED per year	n=69	n=77
<30 000	12 (17.4)	7 (9.1)
30 000–59 999	19 (27.5)	25 (32.5)
60 000–79 999	22 (31.9)	24 (31.2)
>80 000	16 (23.2)	21 (27.3)

Eastern Canada: Prince Edward Island, Nova Scotia, Newfoundland & Labrador, New Brunswick.
*Region and Language preference: for all survey respondents; all other demographics are for eligible participants. Eligibility criteria were those currently practicing adult emergency medicine.
†Region: Western Canada: British Columbia, Alberta, Saskatchewan and Manitoba.
‡CCFP: Canadian College of Family Physicians; CCFP-EM: CCFP with a specialisation in Emergency Medicine; FRCPC-EM: Fellow of the Royal College of Physicians and Surgeons of Canada in Emergency Medicine.
§Multiple: physician holds more than one of the above designations.
¶The variation in denominator for each variable is due to missing or unanswered responses.
ED, Emergency Department.

This is an important finding for the methodology of future postal surveys as the time involved with hand-signing can be replaced with other less time-consuming methods such as e-signatures without negatively affecting response rates. In our survey, both investigators signed approximately 825 letters each, which involved several hours of monotonous labour. Based on our response rate and with 4 reminders to non-respondents, approximately

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Table 2 Response rates in hand-signature vs electronic-signature groups, stratified by language preference

Language preference	Hand-signature	Electronic-signature	Absolute difference (95% CI)	P value*
				0.68
English	35.8%	40%	–4.2% (–13.7% to 5.6%)	
Canadian French	48.4%	47.2%	1.2% (–22.8% to 25.2%)	
Overall	37.7%	40.9%	–3.3% (–12.1% to 5.6%)	

*P value derived from logistic regression interaction term between signature type and language preference.

1825 signatures would be required if all respondents were to receive hand-signatures. Although hand-signatures appear valuable, this step is time-consuming, and our results suggest this step may be replaced with e-signatures thus saving several hours of time and labour. Although we found no statistically significant difference, we note that the response rate was lower in the hand-signature group compared with the e-signature group, which was unexpected. Hand-signatures offer a more authentic method of personalisation which may carry over to sense of trust, compared with e-signatures which may be viewed as less trusted and decrease acceptance;[6] we expected a higher response rate among this group. The electronic signatures were a bold, black colour, whereas the hand-signatures were signed using blue ink. The higher response rate in the electronic signature group may have been due to chance; further research is needed with a larger sample size to better understand these results.

A meta-analysis of randomised controlled trials of strategies that influence response rates to postal surveys among various disciplines, found a higher response rate among more personalised appearing letters compared with less personalised letters (OR 1.16, 95% CI 1.06 to 1.28);[12] however, only 5 of 48 studies included in the analysis compared hand-signatures against printed signatures.[12–14] A previous national postal survey conducted in 1999 with overall response rate of 78.7% found no significant difference between the hand signed group and computer printed group (relative difference 1.01, 95% CI 0.98 to 1.04).[13] Their method of postal administration differed from ours in that they only used two reminders, no incentives and no Xpress post (courier like delivery) in their final reminder. They did, however, use personal salutations whereas ours did not. Their study was conducted in the UK to members of the Royal College of Obstetricians. Our study is 20 years more recent and applicable to future postal surveys, especially for a specialised population of emergency physicians working in busy emergency departments across Canada. Additionally, an electronic signature in present-time looks similar to physical hand-signatures, compared with electronic signatures from the 20th century.

Our study has several strengths. Our methods were adapted and improved from previous postal surveys using the Dillman's technique, such as inclusion of an unconditional US$5 Tim Horton's coffee card with the initial mailout which has been shown to significantly improve response rates[15] and removal of prenotification letters which have shown to result in lower response rates in a study using similar methods to ours.[16] We also used additional measures to ensure physicians who have moved primary practice locations received their survey by verifying with the appropriate provincial regulatory body's website (eg, College of Physicians and Surgeons of Ontario) of any updates to primary practice location before attempting to resend letters that were undeliverable and returned to sender. Previous surveys have not documented this additional step and we found this beneficial in improving our response rate. Our findings may be generalisable to emergency physicians across Canada since the Canadian Medical Directory lists 99% of all practising physicians in Canada. No other database contains postal addresses for Canadian emergency physicians.

Our study has some limitations. Despite using these rigorous methods, we obtained a relatively modest response rate of 39.3%; however, this is higher than other recent surveys among emergency physicians.[17 18] The response rate may be attributed to several factors such as influence from the COVID-19 pandemic, which is known to contribute increased burden and stress on Canadian emergency departments, resulting in less time and perhaps less interest for emergency physicians to complete postal surveys. Research has shown reduced response rates to certain medical surveys during the COVID-19 pandemic as a result of survey fatigue.[19] Additionally, there was an increased hesitancy among the general population with touching foreign materials, including mail, in fear of virus transmission. The survey was conducted from June 2021 to December 2021, in the midst of the pandemic. Furthermore, the Canadian Medical Directory is a common source for other postal surveys; thus, there is a possibility of overlap with other studies. Physicians who receive multiple consecutive surveys may find this too overwhelming and may be less likely to respond. Finally, the detectable difference in our study was relatively large; we were inadequately powered to detect smaller but meaningful differences.

Our study contributes to an important and labour-intensive aspect of the methodology of postal surveys. Future studies should continue to study the effects of personalisation using our methods and include hand-written or e-signed salutations compared with hand-written or e-signed generic salutations to determine if this would enhance response rates.

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CONCLUSION

There was no significant difference in physician response rate between hand-signed and e-signed cover letter and reminder letters. Electronic signatures should be used in future postal surveys among physicians to save on time and labour without impacting response rates.

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Contributors DP is the guarantor and was responsible for the study design, research coordination and data collection. Statistical analysis was conducted by DP and MT. This manuscript was supervised by JJP and MT. The original draft was written by DP. The writing, reviewing and editing of this manuscript was conducted by DP, MT, KY, MH and JJP.

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Competing interests JJP is supported by a mid career peer reviewed salary support from the Ontario Heart and Stroke Foundation.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval This study was approved by the Ottawa Health Science Network Research Ethics Board (protocol ID: 20210212-01H). All participants of the survey received an information sheet stating that participation in the study was voluntary and completion of the questionnaire indicated consent to participate in the study.

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Data availability statement Data are available on reasonable request.

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REFERENCES

1 Taylor T, Scott A. Do physicians prefer to complete online or mail surveys? findings from a national longitudinal survey. *Eval Health Prof* 2019;42:41–70.
2 Shih T-H, Fan X. Comparing response rates in e-mail and paper surveys: a meta-analysis. *Educ Res Rev* 2009;4:26–40.
3 Sebo P, Maisonneuve H, Cerutti B, *et al*. Rates, delays, and completeness of general practitioners' responses to a postal versus web-based survey: a randomized trial. *J Med Internet Res* 2017;19:e83.
4 Dillman AD, Smyth DJ, Christian LM. *Internet, phone, mail, and Mixed-Mode surveys: the tailored design method*. 4th ed. Wiley, 2014.
5 Dillman DA, Lesser V, Mason R, *et al*. Personalization of mail surveys for general public and populations with a group identity: results from nine Studies*. *Rural Sociol* 2007;72:632–46.
6 Chou EY. Paperless and Soulless: E-signatures Diminish the Signer's Presence and Decrease Acceptance. *Soc Psychol Personal Sci* 2015;6:343–51.
7 Patel D, Taljaard M, Yadav K, *et al*. Current practice for primary headache disorders and perspectives on peripheral nerve blocks among emergency physicians in Canada: a national survey. *Headache* 2022;62:512–21.
8 Ontario CMDD Ontario Physician Search, Physician Directory. Canadian Medical Directory Database, Ontario Physician Search, Physician Directory Ontario - Scott's Directory. Scott's Directories. Available: https://www.scottsdirectories.com/canadian-directories/canadian-medical-directory/ [Accessed 23 Oct 2021].
9 Perry JJ, Mansour M, Sharma M, *et al*. National survey of Canadian neurologists' current practice for transient ischemic attack and the need for a clinical decision rule. *Stroke* 2010;41:987–91.
10 Hickey M, Yadav K, Abdulaziz KE, *et al*. Attitudes and acceptability of organ and tissue donation registration in the emergency department: a national survey of emergency physicians. *CJEM* 2022;24:293–9.
11 Abdulaziz KE, Brehaut J, Taljaard M, *et al*. National survey of family physicians to define functional decline in elderly patients with minor trauma. *BMC Fam Pract* 2016;17:117.
12 Edwards P, Roberts I, Clarke M, *et al*. Increasing response rates to postal questionnaires: systematic review. *BMJ* 2002;324:1183.
13 McKenzie-McHarg K, Tully L, Gates S, *et al*. Effect on survey response rate of hand written versus printed signature on a covering letter: randomised controlled trial [ISRCTN67566265]. *BMC Health Serv Res* 2005;5:52.
14 Edwards PJ, Roberts I, Clarke MJ, *et al*. Methods to increase response to postal and electronic questionnaires. *Cochrane Database Syst Rev* 2009:MR000008.
15 Abdulaziz K, Brehaut J, Taljaard M, *et al*. National survey of physicians to determine the effect of unconditional incentives on response rates of physician postal surveys. *BMJ Open* 2015;5:e007166.
16 Hickey M, McIntyre L, Taljaard M, *et al*. Effect of prenotification on the response rate of a postal survey of emergency physicians: a randomised, controlled, assessor-blind trial. *BMJ Open* 2021;11:e052843.
17 Berthelot S, Lang ES, Quan H, *et al*. What are emergency-sensitive conditions? A survey of Canadian emergency physicians and nurses. *CJEM* 2015;17:154–60.
18 Gaucher N, Trottier ED, Côté AJ. A survey of Canadian emergency physicians' experiences and perspectives during the COVID-19 pandemic. *CJEM. Published online* 2021:1–9.
19 de Koning R, Egiz A, Kotecha J, *et al*. Survey fatigue during the COVID-19 pandemic: an analysis of neurosurgery survey response rates. *Front Surg* 2021;8:690680.

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Questionnaire ID				

Appendix A: Survey Questionnaire

Are you currently treating adults in emergency medicine?

☐ Yes ☐ No ***If 'No', please return the survey in the pre-paid envelope provided.***

CURRENT PRACTICE FOR BENIGN HEADACHES – DRUG THERAPIES

We are seeking your valued opinion on how often you use various therapies to treat benign headaches in the emergency department (ED). In this survey, benign headaches are defined as any non life-threatening headache (e.g., acute or chronic migraine, tension headache) where a secondary cause has been ruled out.

1. Please indicate your current pharmacological practice for treating benign headache disorders in the ED

	Always	Most of the time	Some of the time	Almost never	Never
a) Intravenous (IV) NSAID (e.g., ketorolac)	☐	☐	☐	☐	☐
b) ORAL Non-Steroidal Anti-Inflammatory Drug (NSAID) (e.g., Naproxen, ibuprofen)	☐	☐	☐	☐	☐
c) ORAL acetaminophen	☐	☐	☐	☐	☐
d) IV dopamine antagonist (e.g., metoclopramide, chlorpromazine, prochlorperazine, promethazine, haloperidol, other)	☐	☐	☐	☐	☐
e) ORAL dopamine antagonist (e.g., metoclopramide, chlorpromazine, prochlorperazine, promethazine, haloperidol, other)	☐	☐	☐	☐	☐
f) IV or ORAL Co-administration of ketorolac and a dopamine antagonist	☐	☐	☐	☐	☐
g) Triptans	☐	☐	☐	☐	☐
h) Other antiemetics (e.g., dimenhydrinate, ondansetron)	☐	☐	☐	☐	☐
i) Dihydroergotamine (DHE)	☐	☐	☐	☐	☐
j) Oral opioids, (e.g., tramadol, morphine, hydromorphone)	☐	☐	☐	☐	☐
k) Parenteral opioids (e.g., tramadol, morphine, hydromorphone, fentanyl)	☐	☐	☐	☐	☐
l) IV Sodium valproate	☐	☐	☐	☐	☐
m) IV Fluid Boluses ≥ 500 mL	☐	☐	☐	☐	☐
n) Oxygen therapy for cluster headaches	☐	☐	☐	☐	☐
o) IV propofol	☐	☐	☐	☐	☐
p) IV ketamine	☐	☐	☐	☐	☐
q) IV magnesium	☐	☐	☐	☐	☐
r) Other drug therapy not listed above (please specify):_____ _____ _____ _____	☐	☐	☐	☐	☐

2. Do you alter your ED pharmacological management based on type of headache you believe a patient may have (e.g., migraine versus tension/benign headache after ruling out a serious etiology)?

☐ Yes ☐ No

a. If yes, how? _____

_____

_____

_____

PERSPECTIVES ON PERIPHERAL NERVE BLOCKS

In this survey, peripheral nerve blocks are defined as greater or lesser occipital nerve blocks, sphenopalatine ganglion (SPG) blocks/intranasal lidocaine or trigger point injections.

3. Have you ever used a peripheral nerve block in your treatment plan for benign headache disorders?

☐ Yes ☐ No (If you answer 'No', please move to question 4 on page 3)

a. If yes, how frequently have you used <u>each</u> peripheral nerve block for benign headaches in your practice?

	≥ 20 times	**10-19 times**	**≤ 10 times**
i) Occipital nerve block	☐	☐	☐
ii) Sphenopalatine ganglion (SPG) block/intranasal lidocaine	☐	☐	☐
iii) Trigger point injection	☐	☐	☐

b. If yes, do you agree or disagree that alternative treatments such as peripheral nerve blocks could be *more effective* than current standard of care when treating benign headache disorders in the ED?

☐ Agree ☐ Disagree ☐ I have not done enough peripheral nerve blocks to answer.

c. If yes, do you agree or disagree that peripheral nerve blocks are *safe* to use when treating benign headaches in the ED?

☐ Agree ☐ Disagree ☐ I have not done enough peripheral nerve blocks to answer.

d. If yes, do you have a preferred peripheral nerve block for treating various benign headaches?

i) Migraine

☐ Occipital nerve block ☐ SPG block/intranasal lidocaine ☐ Trigger point injection ☐ N/A – I would not consider for this type of headache

ii) Tension

☐ Occipital nerve block ☐ SPG block/intranasal lidocaine ☐ Trigger point injection ☐ N/A – I would not consider for this type of headache

iii) Cluster headache

☐ Occipital nerve block ☐ SPG block/intranasal lidocaine ☐ Trigger point injection ☐ N/A – I would not consider for this type of headache

e. If yes, how would you describe your comfort level when administering a peripheral nerve block?

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i) Occipital nerve block

☐ Very comfortable ☐ Comfortable ☐ Uncomfortable ☐ Very uncomfortable ☐ N/A - I do not perform this nerve block routinely

ii) SPG block/intranasal lidocaine

☐ Very comfortable ☐ Comfortable ☐ Uncomfortable ☐ Very uncomfortable ☐ N/A - I do not perform this nerve block routinely

iii) Trigger point injection

☐ Very comfortable ☐ Comfortable ☐ Uncomfortable ☐ Very uncomfortable ☐ N/A - I do not perform this nerve block routinely

f. In your experience, do most patients experience a significant reduction in pain when given a peripheral nerve block?

☐ Yes ☐ No

i) If yes, this significant reduction in pain was observed when administering: (check all that apply)

☐ Greater or lesser occipital nerve block ☐ SPG block/intranasal lidocaine ☐ Trigger point injection

4. Given sufficient evidence on effectiveness and safety from a randomized controlled trial, would you consider using a peripheral nerve block in the future as a *first line* treatment option for benign headaches?

☐ Yes ☐ No

If no, why not? _____

5. If you perform the SPG block/intranasal lidocaine, which route of administration of anesthetic would you be most comfortable with? (check one)

☐ Nasal cannula ☐ Catheter device ☐ Cotton tip applicator ☐ Intranasal droplets ☐ N/A - I do not know

☐ Other: _____

6. In a planned future trial comparing the SPG block/intranasal lidocaine to standard of care for benign headaches:

a) When is the most clinically meaningful time to reassess the patient's pain?

☐ 15 min ☐ 30 min ☐ 60 min ☐ 90 min ☐ 120 min ☐ Other (please specify):_____

b) What would you consider a clinically significant improvement from baseline pain to the time you answered in question 6a), on a 10-point pain scale?

☐ 1 points ☐ 2 points ☐ 3 points ☐ 4 points ☐ 5 points ☐ Other (please specify):_____

c) Would you consider enrolling your patients with a benign headache into such a study?

☐ Yes ☐ No ☐ Uncertain (please specify):_____

Patel D, *et al. BMJ Open* 2022; 12:e061087. doi: 10.1136/bmjopen-2022-061087

PHYSICIAN DEMOGRAPHICS AND PRACTICE SETTING

Please answer all questions

8. What is your gender?

☐ Male ☐ Female ☐ Other (specify):_____ ☐ Prefer not to say

9. How many years have you been practicing emergency medicine post-residency?

☐ 1-4 ☐ 5-9 ☐ 10-19 ☐ 20 or more

10. Please check ALL the Canadian credentials you currently hold:

☐ CCFP ☐ Other, if other please specify credentials: _____

☐ CCFP-EM

☐ FRCPC-EM

11. In what setting do you perform MOST of your emergency medicine clinical activity?

☐ Academic Health Centre ☐ Other: _____

☐ Community / District General Hospital: Teaching

☐ Community / District General Hospital: Non – Teaching

☐ Rural

12. Approximately how many patient visits, per year, are made to the ED you worked at MOST frequently?

☐ < 30, 000

☐ 30,000 – 59,999

☐ 60,000 – 79, 999

☐ > 80, 000

End of Survey

Please fold and return this survey to a mailbox in the pre-paid envelope provided.
Thank you for taking the time to complete this survey!
Your input is appreciated.

<u>Additional comments:</u> Please feel free to add comments or feedback in the space provided below:

Ottawa Hospital Research Institute
Institut de recherche de l'Hôpital d'Ottawa

Appendix B: Cover Letters – Electronically Signed

Initial Recruitment Letter

Subject Line: Invitation to participate in a study on current practice for benign headache disorders among emergency physicians in Canada.

Dear Colleague,

This letter is being sent to you by Dilan Patel who is currently a Master in clinical epidemiology student being supervised by an emergency physician scientist at The Ottawa Hospital, Dr. Jeffrey Perry. This letter is with regards to a research study that we are conducting. Participation is voluntary.

The overall goal of this study is to assess current practice patterns for benign headaches among Canadian emergency physicians and perspectives on peripheral nerve blocks. Current treatment options for benign headaches in the emergency department (ED) are diverse. Results from this study will provide the foundation for studying alternative treatment options for benign headaches in the ED.

This questionnaire should take about **10 minutes** to complete. Enclosed with this survey is a gift card as gratitude for your time.

There are no foreseeable risks or discomforts associated with your involvement in this study.

Your responses will remain strictly confidential, and no participant identifiers will appear in any publication or presentation resulting from this study. Please note that there will be no written consent for this study. By completing the questionnaire, you are providing your consent to participate in the study. An information sheet is enclosed with more information about this study.

We will send a reminder letter every three weeks for a total of four times if we have not received your returned questionnaire.

The study is filed with Ottawa Health Science Network Research Ethics Board (OHSN-REB) as 20210212-01H. If you have any questions about your rights as a study participant, you may contact the Chairperson of the OHSN-REB at +1 613-798-5555, extension 16719.

If you have any questions regarding the study, please contact the Research Fellow, Dilan Patel at +1 613-798-5555 extension 18617 or at dilpatel@ohri.ca

Thank you for your time.

Sincerely,

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dilpatel@ohri.ca;
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May 27, 2021

Ottawa Hospital Research Institute
Institut de recherche de l'Hôpital d'Ottawa

Reminder Letter – Electronically Signed

Subject: Reminder of invitation to participate in a study on current practice for benign headache disorders among emergency physicians in Canada.

Dear Colleague,

This reminder letter is being sent to you by Dilan Patel who is currently a Master in clinical epidemiology student being supervised by an emergency physician scientist at The Ottawa Hospital, Dr. Jeffrey Perry. Participation is voluntary.

You recently received an invitation **[X] weeks ago** to participate in a research survey regarding current practices for benign headaches and perspectives on peripheral nerve blocks among emergency physicians in Canada. To the best of our knowledge, we have not received your completed questionnaire. I would truly appreciate your consideration in completing the enclosed questionnaire, **which should take about 10 minutes to complete.** We ask that you then return the questionnaire in the postage-paid, addressed envelope.

In brief, the overall goal of this study is to determine patterns in the practice of benign headaches in the emergency department (ED), given the diverse treatment options currently available. By completing the survey, you are providing your consent to participate in the study.

This is the **first** reminder. We will send a reminder letter every three weeks for a total of four times if we have not received your returned questionnaire.

If you choose not to complete the questionnaire but you are open to being contacted by the research coordinator, or if you have any questions regarding the study, please contact the Research Fellow, Dilan Patel at +1 613-798-5555 extension 18617 or at dilpatel@ohri.ca

Thank you once again for you time.

Sincerely,

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Appendix C: Protocol

Current Practices for Benign Headache Disorders and Perspectives on Peripheral Nerve Blocks Among Emergency Physicians in Canada: Protocol for a National Survey

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Author Contributions:

Amendments:
If amendments are to be made to this protocol, we will provide the date of each respective amendment as well as the rationale in this section.

Funding:

Registration:

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ABSTRACT:

Background:

Treatment options for primary headache disorders, including acute and chronic migraine, tension headache and cluster headache in the emergency department (ED) are broad. The current standard of care, which includes nonsteroidal anti-inflammatory drugs (NSAIDs) and dopamine antagonists, may be considered suboptimal due to slow onset and often requires intravenous administration which may cause harmful side effects to patients. Other viable treatment options such as peripheral nerve blocks (PNBs), including occipital nerve blocks, sphenopalatine ganglion blocks and trigger point injections are less often utilized due to limited certainty on efficacy and safety from existing trials, compared to the current standard of care.

Objectives:

Our objective is to survey Canadian emergency physicians (EPs) to determine their current practice for benign headache disorders in the ED and determine EP perspectives on the use of PNBs for benign headache disorders in the ED.

Methods:

We will conduct a cross-sectional postal survey of a random sample of 500 EPs listed in the Canadian Medical Directory. We will utilize a modified Dillman technique including an initial survey with a small unconditional gift card ($5 Tim Horton's coffee card) and up to four additional reminder mailed surveys sent every three weeks to non-responders. For the last survey reminder, we will use a special contact with a courier envelope. A survey instrument will be developed in collaboration with emergency physicians and experts in pain management and appropriately translated to French for francophone physicians. We will pilot the survey and carry out cognitive interviews to determine content and face validity and non-verbal cues of our questionnaire and modify the instrument accordingly.

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Discussion:

It is not currently known how primary headaches are treated in the ED given the wide variety of treatment options. This survey will provide insight on current practice patterns and determine if other known alternatives are currently being used. Results from this survey will provide useful information to guide the design of a future randomized controlled trial to test the effectiveness of alternate treatment options such as SPG blocks for the treatment of primary headache disorders in the ED.

BACKGROUND:

Headaches are a common neurological problem and can be disabling and negatively impact quality of life. The most common headache disorders in primary care are primary headaches, including migraine, tension-type headache and trigeminal autonomic cephalalgias (such as cluster headache) with a global prevalence of 10%, 40% and 0.1% respectively. [1] These headaches are benign in nature and differ from secondary headaches. According to the Global Burden of Disease, migraine alone was the sixth highest cause worldwide of years lost to a disability, and headaches collectively ranked third.[2,3]

According to a US-based study, non-traumatic headaches account for 2.2% of emergency department (ED) visits per year; among this proportion, 98% are benign with the remainder being rare secondary headaches presenting in forms such as subarachnoid hemorrhage (SAH) or other life-threatening forms.[4] Diagnosing headaches in the ED is challenging and requires thoughtful consideration among emergency physicians (EPs). Primary headaches are difficult to diagnose mainly due to lack of awareness and impracticality of the international headache society (IHS) criteria; according to a ED based study, primary headaches were diagnosed for 16% of headache presentations, whereas 84% of headaches were not diagnosed.[5] Guidelines and policies have been implemented by the American College of Emergency Physicians to guide the management of acute headaches[6], as well as rules such as the Ottawa Subarachnoid Rule, to identify life-threatening forms of headache.[7–9]

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Treatment options for primary headaches in the ED are diverse. First-line treatment options for primary headaches include nonsteroidal anti-inflammatory drugs (NSAIDs) such as intravenous (IV) ketorolac, oral or IV acetaminophen, antidopaminergic agents such as IV metoclopramide, prochlorperazine or haloperidol, oxygen therapy for cluster headaches and corticosteroids such as dexamethasone for reduction of headache recurrence.[10] Other medications which may be used consistently are IV fluids if dehydration is present, antiemetics such as dimenhydrinate which is useful against akathisia associated with prochlorperazine use, ondansetron, abortive therapy such as triptans, other butyrophenones such as droperidol, ergotamine, magnesium, IV sodium valproate and parenteral opioids.[10,11]

If first-line medications fail to relieve pain, recommended second-line medications include IV ketamine, IV propofol and peripheral nerve blocks (PNBs) such as the occipital nerve block (ONB), sphenopalatine ganglion (SPG) block or intranasal lidocaine, and trigger point injections .[10] These first-line treatment options are recommended, however may act with significant delay, cause rare but potentially serious side effects or fail to control symptoms of headache. For example, haloperidol is known to cause extrapyramidal symptoms such as acute dystonia, akathisia, neuroleptic malignant syndrome, parkinsonism, tardive dyskinesia and anticholinergic effects, among others.[12,13]

A controversial medication option is the use of parenteral opioids for the treatment of benign primary headaches in the ED. According to a US-based survey, opioids were administered or prescribed in over 50% of migraine visits in the ED.[14] Many societies and committees recommend against using opioids for migraine and other primary headaches.[14–16] Opioids are disadvantageous as a treatment option since their use has been associated with increased frequency of recurrent ED visits, can impair the effectiveness of other migraine treatments, promotes chronic migraine and medication overuse headache and is associated with more psychiatric disorders when dependence is built on

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opioid use.[17] The prevalence of administration or prescription of opioids as a first line treatment for benign headache disorders in the ED among EPs is Canada is currently unknown.

PNBs which target peripheral nerves in the head and neck have gained recent interest for the optimal management of primary headaches in the ED. PNBs are understudied and potentially less often utilized as a treatment option in the ED. These minor bedside procedures involve a subcutaneous local injection of a small volume of a local anesthetic agent to target areas such as the greater or lesser occipital nerve, or sphenopalatine ganglion to promote neural blockade and break the pain cycle. Randomized controlled trials (RCTs) have been conducted to study the efficacy and safety of occipital nerve blocks on various forms of headache.[18–22] Several RCTs currently exist which study SPG blocks or intranasal administration of anesthetics[23–29]; the results are mixed, some trials found SPG blocks to provide statistically significant pain relief[23,25,27,28] and some found no difference compared to placebo.[26,29] To our knowledge, no trial currently exists which studies the SPG block or intranasal lidocaine in Canada among the adult population for benign headaches in the ED. The SPG block is the least invasive of the PNBs especially with its intranasal route of administration, compared to the subcutaneous injection across the scalp of occipital nerve blocks or trigger point injections. For this reason, we also seek to investigate EP perspectives and attitudes towards using PNBs for benign headaches in the ED. Results from this survey will lay the foundation to study SPG blocks in the form of an RCT in Canada to potentially achieve a more successful and faster management of benign primary headaches in the ED compared to current standard of care.

OBJECTIVES:

The primary objective of this survey is to understand current practice patterns for benign primary headaches among EPs. This objective will provide insight into unanswered and important questions such as if EP's cotreat primary headaches with ketolorac and dopamine antagonists, if dexamethasone is used to prevent headache recurrence and the frequency of opioid use across Canada.

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Secondary objectives are to determine EP perspectives on PNBs in terms of frequency of use, effectiveness, preference, and comfort level. Additionally, we will further investigate the SPG block in terms of preferred route of administration and inquire about the optimal time point to reassess pain after giving a PNB. Lastly, we will inquire about the minimal clinically important reduction in pain on a standard pain scale to safely discharge a patient presenting with a benign headache, home. This will inform the choice of an effect size to use in the sample size calculation for the future trial.

METHODS:

Study design and Setting:

We plan to conduct a national postal survey of a random sample of 500 Canadian EP's listed in the Canadian Medical Directory[30] according to a modified Dillman's tailored design method for survey design and administration.[31] We will use simple random sampling to select our sample.

Survey instrument construction:

The survey instrument will be developed in collaboration with physicians consisting of clinical experts in emergency medicine and pain medicine. The survey will be piloted with a random sample of 20 EP's and revised based on feedback. The survey should take 10-15 minutes to complete and will consist of binary questions (yes/no answers) and likelihood questions (i.e., always, most of the time, some of the time, almost never, never) on Likert scales. Survey questions will capture demographic data such as EP level of experience and address the following: 1) Current practices for benign headache assessment and treatment in the ED; 2) Challenges and limitations of current practice if any; 3) Perspectives on PNBs, specifically the SPG block; 4) The optimal time to reassess pain after administering a PNB; 5) The minimal clinically important relief of pain for safe discharge home.

We will pilot the first draft of the survey instrument and perform cognitive interviews as a psychologically derived method to understand how individuals respond to our questionnaire prior to

administering the survey. Based on this interview, we will modify questions accordingly based on feedback and reactions to questions.

The survey instrument will be translated to French by a research coordinator fluent in the language, for francophone physicians, and approved by language services

Data Collection Strategy:

The survey will be administered according to the following procedure: (i) initial survey with an incentive ($5 Tim Horton's gift card) with the first survey and (ii) a reminder of survey completion through a new survey instrument, every three weeks for a total of four times, with the final notification using a special contact (e.g., Xpress post). Previous surveys have demonstrated >50% response rates using these methods.[32–34] For letters that are returned to sender due to unknown or outdated address, we will search the College of Physicians and Surgeons or equivalent in their respective jurisdiction to determine if there has been a change in primary practice location and attempt to re-send to their current practice location.

Survey responses and data will be input into Microsoft Excel v. 16 and statistical analyses will be conducted using SAS v. 9.4 (SAS Institute Inc. Cary, NC, USA). Incentives will be provided for survey respondents up front and attached with the mail in survey. All data management and study coordination will be at the Ottawa Hospital Research Institute.

Sub-studies

We will conduct a sub-study with half of the survey respondents (n = 250) receiving hand-signed recruitment and reminder letters and the other half of the survey respondents receiving electronically signed recruitment and reminder letters. The rationale for this is to determine if there is a difference in response rates between hand signatures compared to electronic signatures. This would provide useful recommendations for future postal surveys.

Analysis and Sample Size Calculation:

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We will use descriptive statistics to describe the results from the survey including and frequencies and percentages for categorical variables. Comparisons will be conducted using chi-squared tests for categorical variables (i.e. differences based on EP level of experience).

A random sample of 500 emergency physicians listed in the Canadian Medical Directory will be surveyed. The large sample size will reduce sampling error and improve generalizability. The random sample will be selected using a computer-generated randomization sequence. A random sample of 500 EP's with a response rate of 50% is adequate to estimate the primary outcome (i.e., the proportion of survey respondents who use each class of drugs "always" or "most of the time") using a two-sided 95% confidence interval with a margin of error no greater than 6.2% assuming the most conservative prevalence estimate of 0.5.

ETHICAL CONSIDERATIONS:

Prior to collecting any data, this protocol will be reviewed by the Ottawa Health Science Network Research Ethics Board. In the cover letter of our designed survey, we will state that participation is voluntary and survey responses will be kept confidential. Responding to a survey will be considered implied consent. We will keep sensitive information such as personal identifiers confidential and will be store separately from the data collected in the survey instrument.

CLINICAL IMPLICATIONS

Since headache presentations are prevalent and complex with multiple treatment options, it is important to understand frequently used medications in an EP's treatment plan across Canada. Based on this survey, we would have a better sense of a Canada-wide EP perspective on commonly used treatment methods for benign headache disorders, and insights on alternative treatments such as PNBs. We hope to fill the gap in headache treatment by providing evidence on current treatments and insight towards the SPG block which may be faster and more effective at relieving pain and reduce the use of opioid and other medications with known side effects.

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REFERENCES:

1. Rizzoli P, Mullally WJ. Headache. *The American Journal of Medicine*. 2018;131(1):17-24. doi:10.1016/j.amjmed.2017.09.005

2. World Health Organization (WHO). Headache disorders. Accessed November 27, 2020. https://www.who.int/news-room/fact-sheets/detail/headache-disorders

3. James SL, Abate D, Abate KH, et al. Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990–2017: a systematic analysis for the Global Burden of Disease Study 2017. *The Lancet*. 2018;392(10159):1789-1858. doi:10.1016/S0140-6736(18)32279-7

4. Goldstein J, Camargo C, Pelletier A, Edlow J. Headache in United States Emergency Departments: Demographics, Work-up and Frequency of Pathological Diagnoses. *Cephalalgia*. 2006;26(6):684-690. doi:10.1111/j.1468-2982.2006.01093.x

5. Cerbo R, Villani V, Bruti G, Di Stani F, Mostardini C. Primary headache in Emergency Department: prevalence, clinical features and therapeutical approach. *J Headache Pain*. 2005;6(4):287-289. doi:10.1007/s10194-005-0210-1

6. Edlow JA, Panagos PD, Godwin SA, Thomas TL, Decker WW. Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients Presenting to the Emergency Department With Acute Headache. *Annals of Emergency Medicine*. 2008;52(4):407-436. doi:10.1016/j.annemergmed.2008.07.001

7. Perry JJ, Stiell IG, Sivilotti MLA, et al. High risk clinical characteristics for subarachnoid haemorrhage in patients with acute headache: prospective cohort study. *BMJ*. 2010;341. doi:10.1136/bmj.c5204

8. Perry JJ, Stiell IG, Sivilotti MLA, et al. Clinical Decision Rules to Rule Out Subarachnoid Hemorrhage for Acute Headache. *JAMA*. 2013;310(12):1248-1255. doi:10.1001/jama.2013.278018

9. Perry JJ, Sivilotti MLA, Sutherland J, et al. Validation of the Ottawa Subarachnoid Hemorrhage Rule in patients with acute headache. *CMAJ*. 2017;189(45):E1379-E1385. doi:10.1503/cmaj.170072

10. Long BJ, Koyfman A. Benign Headache Management in the Emergency Department. *The Journal of Emergency Medicine*. 2018;54(4):458-468. doi:10.1016/j.jemermed.2017.12.023

11. Gupta S, Oosthuizen R, Pulfrey S. Treatment of acute migraine in the emergency department. *Can Fam Physician*. 2014;60(1):47-49.

12. Rahman S, Marwaha R. Haloperidol. In: *StatPearls*. StatPearls Publishing; 2020. Accessed November 29, 2020. http://www.ncbi.nlm.nih.gov/books/NBK560892/

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13. Dold M, Samara MT, Li C, Tardy M, Leucht S. Haloperidol versus first-generation antipsychotics for the treatment of schizophrenia and other psychotic disorders. *Cochrane Database of Systematic Reviews*. 2015;(1). doi:10.1002/14651858.CD009831.pub2

14. Friedman BW, West J, Vinson DR, Minen MT, Restivo A, Gallagher EJ. Current management of migraine in US emergency departments: An analysis of the National Hospital Ambulatory Medical Care Survey. *Cephalalgia*. 2015;35(4):301-309. doi:10.1177/0333102414539055

15. Loder E, Weizenbaum E, Frishberg B, Silberstein S. Choosing Wisely in Headache Medicine: The American Headache Society's List of Five Things Physicians and Patients Should Question. *Headache: The Journal of Head and Face Pain*. 2013;53(10):1651-1659. doi:https://doi.org/10.1111/head.12233

16. Orr SL, Friedman BW, Christie S, et al. Management of Adults With Acute Migraine in the Emergency Department: The American Headache Society Evidence Assessment of Parenteral Pharmacotherapies. *Headache: The Journal of Head and Face Pain*. 2016;56(6):911-940. doi:https://doi.org/10.1111/head.12835

17. Gelfand AA, Goadsby PJ. A Neurologist's Guide to Acute Migraine Therapy in the Emergency Room. *The Neurohospitalist*. 2012;2(2):51-59. doi:10.1177/1941874412439583

18. Özer D, Bölük C, Türk Börü Ü, Altun D, Taşdemir M, Köseoğlu Toksoy C. Greater occipital and supraorbital nerve blockade for the preventive treatment of migraine: a single-blind, randomized, placebo-controlled study. *Current Medical Research and Opinion*. 2019;35(5):909-915. doi:10.1080/03007995.2018.1532403

19. Ashkenazi A, Matro R, Shaw JW, Abbas MA, Silberstein SD. Greater occipital nerve block using local anaesthetics alone or with triamcinolone for transformed migraine: a randomised comparative study. *Journal of Neurology, Neurosurgery & Psychiatry*. 2008;79(4):415-417. doi:10.1136/jnnp.2007.124420

20. Inan LE, Inan N, Karadaş Ö, et al. Greater occipital nerve blockade for the treatment of chronic migraine: a randomized, multicenter, double-blind, and placebo-controlled study. *Acta Neurologica Scandinavica*. 2015;132(4):270-277. doi:10.1111/ane.12393

21. Kashipazha D, Nakhostin-Mortazavi A, Mohammadianinejad SE, Bahadoram M, Zandifar S, Tarahomi S. Preventive Effect of Greater Occipital Nerve Block on Severity and Frequency of Migraine Headache. *Glob J Health Sci*. 2014;6(6):209-213. doi:10.5539/gjhs.v6n6p209

22. Korucu O, Dagar S, Çorbacioglu ŞK, Emektar E, Cevik Y. The effectiveness of greater occipital nerve blockade in treating acute migraine-related headaches in emergency departments. *Acta Neurologica Scandinavica*. 2018;138(3):212-218. doi:10.1111/ane.12952

23. Cady R, Saper J, Dexter K, Manley HR. A Double-Blind, Placebo-Controlled Study of Repetitive Transnasal Sphenopalatine Ganglion Blockade With Tx360® as Acute Treatment for Chronic Migraine. *Headache: The Journal of Head and Face Pain*. 2015;55(1):101-116. doi:10.1111/head.12458

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24. Schaffer JT, Hunter BR, Ball KM, Weaver CS. Noninvasive Sphenopalatine Ganglion Block for Acute Headache in the Emergency Department: A Randomized Placebo-Controlled Trial. *Annals of Emergency Medicine*. 2015;65(5):503-510. doi:10.1016/j.annemergmed.2014.12.012

25. Barzegari H, Motamed H, Ziapour B, Hajimohammadi M, Kadkhodazadeh M. Intranasal Lidocaine for Primary Headache Management in Emergency Department; a Clinical Trial. *Emerg (Tehran)*. 2017;5(1). Accessed November 30, 2020. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5703756/

26. Blanda M, Rench T, Gerson LW, Weigard JV. Intranasal lidocaine for the treatment of migraine headache: A randomised, controlled trial. *Clinical Cornerstone*. 2001;4(3):65-65. doi:10.1016/S1098-3597(01)90040-7

27. Maizels M. Intranasal Lidocaine for Treatment of Migraine: A Randomized, Double-blind, Controlled Trial. *JAMA*. 1996;276(4):319. doi:10.1001/jama.1996.03540040063034

28. Mohammadkarimi N, Jafari M, Mellat A, Kazemi E, Shirali A. Evaluation of efficacy of intra-nasal lidocaine for headache relief in patients refer to emergency department. *J Res Med Sci*. 2014;19(4):331-335.

29. Avcu N, Doğan NÖ, Pekdemir M, et al. Intranasal Lidocaine in Acute Treatment of Migraine: A Randomized Controlled Trial. *Annals of Emergency Medicine*. 2017;69(6):743-751. doi:10.1016/j.annemergmed.2016.09.031

30. Canadian Medical Directory 54th Ed. Business Information Group. Accessed October 6, 2020. https://www.scottsdirectories.com/ppc-business-directory/

31. Dillman AD, Smyth DJ, Christian LM. *Internet, Phone, Mail, and Mixed-Mode Surveys: The Tailored Design Method*. Fourth. Wiley

32. Perry JJ, Symington C, Mansour M, Taljaard M, Stiell IG. Is this subarachnoid hemorrhage significant? A National Survey of Neurosurgeons. *Can J Neurol Sci*. 2012;39(5):638-643. doi:10.1017/s0317167100015389

33. Cummings SM, Savitz LA, Konrad TR. Reported response rates to mailed physician questionnaires. *Health Serv Res*. 2001;35(6):1347-1355.

34. Asch DA, Jedrziewski MK, Christakis NA. Response rates to mail surveys published in medical journals. *J Clin Epidemiol*. 1997;50(10):1129-1136. doi:10.1016/s0895-4356(97)00126-1

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