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Paramedic perceptions of barriers to pre-hospital oral analgesia administration

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Research

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Abstract

Introduction

Pre-hospital analgesia is administered at a suboptimal rate. We aimed to identify barriers to pre-hospital oral analgesia administration to adult patients, as perceived by paramedics, using qualitative methods.

Methods

Paramedics from a county emergency medical service were invited to participate in semi-structured interviews. The interviews consisted of two questions regarding barriers to pre-hospital administration of oral analgesia using a previously established medical directive. The same investigator completed all interviews, which were audio recorded and transcribed verbatim. Barriers to analgesia administration to adult patients were identified from the interview transcripts using open coding of the data. Two investigators completed the coding process independently and discrepancies were then resolved by consensus. Code frequencies were tabulated and thematic analysis was used to organise the data into broad domains and themes.

Results

In total, 44 paramedics of a possible 46 (95.7%) completed a semi-structured interview. The final sample size was 43 after exclusion criteria were applied. The median paramedic age and practice experience was 39 and 9.5 years respectively, and 58% of the participants were male. Barriers to oral analgesia administration emerged in the domains of patient, medical directive, and paramedic factors.

Conclusion

Paramedic perceived barriers to pre-hospital oral analgesia administration were identified and include those related to patient, medical directive, and paramedic factors. Minimising these barriers should be undertaken to reduce rates of pre-hospital under-treatment of pain and improve pre-hospital pain management.

Keywords:

emergency medical services; pain management; analgesia

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Introduction

Adequate pre-hospital pain management has ubiquitously been established as a primary goal for emergency medical service (EMS) providers (1-3). This is based on evidence demonstrating the adverse effects of inadequate pain control and benefits of satisfactory pain management in both adult and paediatric pre-hospital patient populations (4). Unfortunately, pre-hospital analgesia is administered by paramedics at an alarmingly low rate (5-7). Theories to explain this under-treatment of pain have been put forward by previous works (8-10), yet the practical barriers accounting for it remain largely unclear. Specifically, the administration of analgesia by an oral route has not been well studied in the pre-hospital setting. This lack of evidence has been acknowledged by international EMS governing bodies and recognised as an area for future research (11,12).

The aim of this study is to identify barriers to pre-hospital oral analgesia administration to adult patients, from the perspective of paramedics, using qualitative methods. This research is important, as it will help identify potential causes of under-treatment of pain from the perspective of front line clinicians responsible for pre-hospital pain management. Further motivation to complete this study was provided by a continuing quality improvement pilot project at our site that suggested the oral analgesia directive was not being used at all potential opportunities. Additionally, our findings will be useful to EMS medical directors by informing the refinement of paramedic education delivery modes and curricula to overcome these the pain management barriers and improve patient care.

Methods

Study design

A qualitative, semi-structured interview design was used. Semi-structured interviews are intended to generate interviewees' accounts of their own perspectives, perceptions, experiences, understandings and interpretations (13). Each participant was asked the same questions, which were established prior to data collection (Table 1).

Interview questions	
1.	What barriers, if any, have prevented you from using the oral analgesia medical directive for pain associated with isolated hip or extremity trauma in your practice as a paramedic?
2.	Is there anything else you would like to share with me?

Table 1. Interview questions

The questions were designed to be open-ended, generate dialogue, and free of double-barrelled or leading features. The full interview schedule is found in Appendix 1. Participation was voluntary and informed written consent was obtained from all participants prior to being interviewed. A café gift card with a value of 5 dollars was offered as a token for participation. This was self-funded by one of the investigators, Dr Michelle Welsford. We followed established standards for reporting qualitative research [14], and the Hamilton Integrated Research Ethics Board approved the study prior to data collection.

Population and setting

Primary care paramedics (PCPs) employed by the Haldimand County Emergency Medical Service (HCEMS) in Ontario, Canada, were recruited for participation. The HCEMS provides emergency response to 44,876 residents of rural and suburban communities under the jurisdiction of the Hamilton Health Sciences Centre for Paramedic Education and Research base hospital (15). The HCEMS is comprised only of PCPs who do not have access to advanced care paramedic support during a call. As opposed to advanced care paramedics who can administer opioids and other analgesics, PCPs in Ontario can administer some symptom relief medications, but do not generally administer parenteral medications and cannot administer opioids. The HCEMS receives service calls through a central ambulance communications (dispatch) centre shared with five other regional services and located in Hamilton, Ontario.

All HCEMS primary care paramedics attending the service's continuing education events held in January of 2014 were invited to participate in an interview. This group of PCPs were of interest for this study as HCEMS had implemented an oral analgesia medical directive over the 18 months prior to data collection. This directive allows HCEMS primary care paramedics to administer oral acetaminophen or ibuprofen for painful isolated extremity injuries without prior contact with medical oversight (Table 2). The directive could only be used for adult patients. Online, self-directed education modules and live didactic sessions were used to educate the paramedics about the directive prior to use in the field. Evaluation of paramedic understanding and competence regarding the directive was conducted prior to it going live for field use. Subjects were excluded from participation if they were less than 18 years of age or were not currently practising as a paramedic.

Experimental protocol

All interviews were conducted by the principal investigator, Dr Dean Vlahaki to ensure consistency. Interviews were digitally recorded in audio format and subsequently transcribed verbatim into an electronic transcript. Each interview was assigned a numeric code to preserve anonymity of the responses.

Oral analgesia auxiliary medical directive		
A primary care paramedic may provide the treatment prescribed in this auxiliary medical directive if certified and authorised		
Specific treatments to consider	Acetaminophen: Orally Single dose of 960–1000 mg Maximum single dose of 1000 mg	Ibuprofen: Orally Single dose of 400 mg Maximum single dose of 1000 mg
Conditions	Age greater than or equal to 18 years Unaltered level of consciousness	Age greater than or equal to 18 years and age <50 years Unaltered level of consciousness
Indications	Isolated hip OR extremity trauma AND pain	
Contraindications	Allergy or sensitivity to acetaminophen Active vomiting, unable to take oral medication Major burns History of liver disease	Allergy or sensitivity to ASA or NSAIDs Active vomiting, unable to take oral medication Major burns History of peptic ulcer disease or Gastrointestinal bleed Pregnant History of cardiovascular disease If asthmatic, no prior use of ASA CVA or TBI in the previous 24 hours
Clinical considerations	Whenever possible, both acetaminophen and ibuprofen should be used together	

* ASA = acetylsalicylic acid (aspirin); NSAIDs = non-steroidal anti-inflammatory drugs; CVA = cerebrovascular accident; TBI = traumatic brain injury

Table 2. Auxiliary oral analgesia medical directive

Experimental protocol

The first question asked paramedics to identify barriers specific to the oral analgesia protocol discussed above. The second question allowed participants to express any relevant information or opinions not previously mentioned, pertaining to the administration of oral analgesia or otherwise and was included to generate discussion and expression of paramedic perceptions of barriers to oral analgesia administration not already mentioned. Participant demographic data was also collected, including age, gender and the number of years of practice as a paramedic.

Analysis

Interview transcripts were analysed using grounded theory principles (16,17). Relevant participant responses for each core question were assigned codes to identify the data by two investigators, Dr Dean Vlahaki and Elayne Vlahaki, each blinded to the code assignments of the other. Once coded, assignments were checked for agreement and conflicts in code assignment were resolved by consensus. A third investigator was available for a tiebreak in the event consensus could not be reached.

Repeat information or duplicate responses within a single interview were coded only once. After fully coding the transcripts, thematic analysis was completed to identify domains and themes for oral analgesia administration barriers (18). The frequency of codes was also tabulated.

Member validation was used to validate our findings (19). Specifically, the study results were presented at a summative seminar attended by members of the Centre for Paramedic Education and Research base hospital program and local emergency medicine physicians. There was open discussion of the results and attendees were encouraged to confirm or reject our findings based on their experience and observations with regards to the use of medical directives in the field. These individuals were familiar with the oral analgesia directive and medical directive implementation process and therefore were able to validate or reject our findings.

Results

Semi-structured interviews were conducted over four days from 13 to 16 January 2014. In total, 44 paramedics were interviewed out of a possible 46 (95.7%) employed by HCEMS, with two paramedics declining participation. One paramedic was excluded from the final data set because the individual had not yet worked any shifts as a paramedic, yielding a final sample size of 43 (Figure 1).

Figure 1. Participant recruitment and application of exclusion criteria

* APR = annual practice review

Demographic statistics for all participants are shown in Table 3.

Participant demographic statistics	
Number of male participants (%)	25 (58%)
Median paramedic age (interquartile range)	39 years (29.5–45)
Median years in practice (interquartile range)	9.5 years (4–20)

Table 3. Descriptive data for the final sample of participants

All code assignments were achieved by consensus without requirement of a tiebreak. Additionally, none of the results were refuted or rejected during the member validation process. The results of the open coding and thematic analysis process revealed three domains and eight themes for barriers to pre-hospital oral analgesia administration (Table 4). Representative quotations were obtained corresponding to each theme and are also displayed in Table 4.

Discussion

Administration of analgesia in the pre-hospital environment occurs at a suboptimal frequency and has become a growing concern (5-7). We identified barriers to administration of oral analgesia to patients as perceived by paramedics. These barriers were best grouped into the domains of patient, medical directive and paramedic factors.

Patient factors

The perceived negative impact of the patient on the analgesia administration process is an important finding in this study. Paramedics indicated patients would frequently refuse analgesia under the hypothesis that acetaminophen or ibuprofen are low potency analgesics and elected to wait for stronger analgesia at the receiving facility. Previous research supports the finding that patient perception of analgesics and compliance can be significant barriers to administration (20). In clinical practice, a lack of patient buy-in may render utilisation of medical directives impossible. Furthermore, paramedics may be discouraged from offering the analgesia in future instances after a negative patient encounter. The effect of interventions designed to improve patient collaboration and educate patients at the point of care is a valuable area for future investigation.

Practical barriers to medical directive utilisation associated with the patient were also identified. Patients that are immobilised supine on a spinal board or are nauseated present unique challenges to oral analgesia administration. These barriers may be difficult to modify, given they are a product of the patient's condition.

Medical directors may consider implementing directives with alternative routes of medication delivery in these cases (eg. intramuscular, intravenous, per rectum, topical) or even premedication with an antiemetic.

Medical directive factors

Paramedics reported that the medical directive itself was restrictive in scope and limited in the patient situations it applied to. Certainly there are a myriad of complaints other than acute extremity injuries that could benefit from oral analgesia. While not a barrier to use of this directive for its predetermined indications, this finding reflects the paramedics' recognition that other painful complaints could benefit from the provision of oral analgesia. Overall, this is a positive result, as previous research has identified paramedic under-recognition of painful conditions as a significant barrier accounting for poor analgesia administration rates (21).

Difficulty interpreting the conditions of the directive was also an issue. Paramedics reported the directive was unclear, to the extent that it could not be effectively employed in the field. For example, the directive gives no specific instruction with regards to the acuity of the injury, making it uncertain if sub-acute or chronic injuries are viable indications. Furthermore, the directive itself provides no precise definition of an extremity and paramedics expressed uncertainty regarding whether injuries to the proximal humerus, shoulder or clavicle were considered part of the extremity for this directive. We are unaware of any other literature identifying paramedic interpretation of medical directive conditions after implementation serving as a barrier to analgesia administration. This result is concerning, because although this information was a component of the initial education introducing the directive, insufficient understanding of the directive at the outset could spoil downstream use. Base hospitals should be mindful of this issue and consider providing formal opportunities for paramedic feedback regarding directives after they have been activated for field use. Directives could then be refined to make them more user-friendly for the front line practitioner.

Paramedic assessment of pain using a standard assessment tool has been promoted as a pre-hospital vital sign (1). Despite this, difficulty in accurately assessing pain has been identified as an obstacle to analgesia administration in the literature (21,23). No paramedics in our study indicated that their ability to assess pain hindered analgesia administration. This barrier may have been circumvented because our directive simplified the required assessment of patient pain to a dichotomous decision (is pain present, or not). Perhaps using a dichotomous assessment of patient pain in this way

could improve analgesia administration rates in other settings where more complicated pain scores are currently used to decide if and what type of analgesia is to be administered.

Paramedic factors

Negative attitudes held by paramedics towards oral analgesia were identified as barriers to utilisation of this directive. Specifically, subjects indicated that restricting them to administer only acetaminophen and ibuprofen when patients could otherwise obtain these medications over-the-counter undervalued their clinical skills and judgement. Previous work has also found that paramedics' negative attitudes toward perceived low potency oral analgesics when compared to opioids or parental medications are a barrier to administration (10).

Although opioid administration may be appropriate for moderate to severe pain, oral administration of acetaminophen and ibuprofen is suitable for many conditions and has been shown to reduce the need for opioid analgesics while providing similar pain relief (24-26). As opioids are not approved for PCP use in Canada and other countries, acetaminophen and ibuprofen are viable reasonable options for analgesia and the commonly held belief that these drugs are inadequate for pre-hospital pain management is unjustified. Furthermore, it is likely that patient compliance is greatly influenced by paramedic attitudes. Paramedic agreement with the directives they use is undoubtedly an important component of their successful use.

Fear of professional punishment for using the directive incorrectly was cited as a barrier for 7% of paramedics. While this represents a small portion of our sample, this result is discouraging. If paramedics do not utilise directives for this reason it would represent a waste of resources, given the significant amount of time and resources base hospital groups invest in continuing education. The reasons for this fear of punishment cannot be inferred from our data and may not be generalisable to other base hospital groups, but may reflect an underlying culture of punitive feedback within the EMS domain and should be examined further.

Paramedic knowledge retention with regards to the details of the directive was another barrier. This may be directly related to perceived lack of opportunities to use the directive as the HCEMS paramedics in this study service suburban and rural communities with a relatively lower call volume than urban services. This barrier indicates that more frequent directive review may be required in lower volume services to keep paramedic skills and knowledge up-to-date and maintain directive utilisation rates.

Domains	N	%	Theme	N	%	Representative paramedic quotes
Patient factors	39	91%	Patient non-compliant because they anticipate more potent analgesia will be given at the receiving facility	15	35%	"... we are offering people something they have in their medicine cabinet. They are often expecting something stronger."
			Patient positioning makes pill administration difficult or dangerous (eg. immobilised on backboard)	14	33%	"... A lot of times the patient wasn't interested in taking oral Tylenol or Advil. They had often taken something already that was stronger, like narcotics that they already had in their medicine cabinet... I would offer it to them and they would say they are holding out for something better at the hospital."
			Patient indicates that they are physically unable to swallow pills/medications	8	19%	"... they are always in a position where they can't take oral medications... because they are on a board or scoop stretcher... making it unsafe to swallow pills."
			Patient indicates that the pills are too large in size or there are too many to swallow	6	14%	"... there was a case recently that the patient just refused.... altogether. There are patients that refuse because they can't swallow pills."
			Patient cannot take pills because they are nauseated or vomiting	2	5%	"... it's a lot to hand them five pills and ask [the patient] to swallow [them]."
Medical directive factors	39	91%	Directive restrictive in scope (eg. specific ages; only for extremities; only for trauma)	17	40%	"... [patients may not] be able to drink the water or take the pills if they are vomiting or they break their leg and get that sick feeling in their stomach and they are going to vomit."
			Low frequency of calls completed where the medical directive applied	17	40%	"It's isolated in the fact that it's based on trauma, isolated hip or extremity trauma... We can't give it to someone with chronic pain or a strain type pain, like in overuse. It's limited in that scope."
			Directive conditions are unclear (eg. definition of an extremity or acuity of injury are not specified)	10	23%	"You learn something [in the annual practice reviews] and then you don't do it for three months from now. How much am I going to retain?"
			Two or more directives are in conflict preventing the use of the analgesia directive (i.e. the patient is NPO, so no oral analgesia)	4	9%	"... well someone's got, say, signs and symptoms of a separated shoulder. Now is that extremity trauma or is it from the humerus down? What falls within the protocol?"
						"One thing I am confused about, [is if the patient is] NPO... I can't give oral ibuprofen and acetaminophen. That has to be more clear, about this NPO thing."
Paramedic factors	12	28%	Paramedic holds negative attitude towards the directive (eg. clinical judgement undervalued)	5	12%	"The perception by paramedics that I hear in the field, probably by myself as well as others, is that we look at Tylenol and ibuprofen as something we take at home over the counter so really it's a 'mamsy pamsy' kind of drug to be giving as a 9-1-1, so I guess that's kind of the perception out there."
			Fear of professional punishment for using the directive incorrectly or for borderline indication	3	7%	"You would rather not act on something and have a reason for it, than act on something and be left accountable."
			Paramedic knowledge retention is insufficient to use the directive correctly or safely	3	7%	"As time goes by you forget the information... because we are not using it on a daily basis."
			Proximity to the hospital too close to justify delaying transport to administer oral analgesia	2	5%	"A lot of these hip and extremity fractures you pick them up and you are a three minutes transport to the hospital. Strategically, when you are trying to manage the call, you become more focused on just getting the patient over to the emergency room instead of pursuing the oral analgesics."
			Disagreement between partners if use of the directive is indicated	1	2%	"If your partner doesn't want you to give it, that is a major challenge to actually giving the drug."

* NPO = nil by mouth

Table 4. Broad domains and themes for paramedic-perceived barriers to oral analgesia administration. The number and percentage of total paramedics indicating the particular responses are provided, along with representative quotations from interview transcripts

Limitations

Our findings are subject to the strengths, limitations and biases inherent to qualitative research and semi-structured interview methods (27). The interviewer (Dean Vlahaki) was not blinded to the study objectives and potentially could have biased participant responses, although the scripted questions were designed to mitigate this. Additionally, HCEMS is a small paramedic service that covers rural communities in Ontario (Canada), which could limit the external validity of our findings to other jurisdictions.

Conclusion

Novel barriers to oral analgesia administration in the rural pre-hospital setting were identified and included patient, medical directive and paramedic factors. Overcoming these barriers should be a focus for base hospital medical directors in an effort to improve rates of analgesia administration and pre-hospital pain management. Potential interventions to be explored include improving patient collaboration with pain directives, seeking regular feedback with paramedics on use of directives in the field, refining directives to be more user-friendly, minimising physical barriers to oral analgesia administration, addressing paramedic negative attitudes toward oral analgesia and simplifying pain assessment requirements prior to analgesia administration.

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Conflict of interest

Each author of this paper has completed the ICMJE conflict of interest statement. Dr Welsford is the Medical Director of the Hamilton Health Sciences Centre for Paramedic Education and Research and receives funding for this role. No investigators received direct financial compensation for their involvement in this study, nor are there any other conflicts of interest to declare. Dr Welsford provided a token café gift card, with a value of five dollars, to all subjects as an incentive to participate and this was self-funded.

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Appendix 1. Full interview schedule read by the interview verbatim

Interviewer:

Thank you for agreeing to participate in this study. I will take the opportunity to remind you that this interview is being recorded and you may withdraw from participation at any point. You do not have to answer any of the following questions if you do not wish to do so. If you wish to withdraw from participation then please let me know.
Are you ready to proceed?

Let's begin the interview with some questions about your background and your education as a paramedic.

Questions:

1. Are you a currently practising paramedic participating in the Hamilton Health Sciences Centre for Paramedic Education and Research education curriculum?
2. What is your age?
3. Are you male or female?
4. What year did you graduate from your paramedic studies?
5. What paramedic credentials do you possess or did you obtain (eg. primary care paramedic)?
6. How long have you been practising as a paramedic?

Now I am going to ask you some questions about your continuing education and annual practice review sessions. Are you ready to proceed?

In July of 2012 an oral analgesia medical directive was implemented allowing paramedics to give acetaminophen and ibuprofen for painful isolated hip or extremity trauma.

1. What barriers, if any, have prevented you from using the oral analgesia medical directive for pain associated with isolated hip or extremity trauma in your practice as a paramedic?
2. Is there anything else you would like to share with me?

That concludes the interview. Thank you for participating. If you would like a summary of the results at the conclusion of the study, please let me know and this can be arranged.