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Navigating emotions, communication, and pain during prehospital labour: a mixed-methods survey with emergency ambulance services

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Abstract

Introduction Despite their crucial role in prehospital obstetric emergencies, there is little research exploring emergency medical service (EMS) personnel's perspectives and attitudes on out-of-hospital births, including balancing the numerous needs of the patient. Our aims were to (1) identify how EMS demographics and professional experience related to their confidence and comfort in treating a patient in labour and (2) explore EMS' perspectives on managing emotional needs and administering analgesia in a labour and birth setting in New Zealand (NZ).

Methods This mixed-methods survey invited frontline clinical personnel from Hato Hone St John – the main EMS provider in NZ – to complete an online survey about unplanned out-of-hospital births. Self-reported confidence attending birth events and administering analgesia to women in labour was compared across participant demographic and professional characteristics. Qualitative content analysis was applied to free-text questions.

Results One hundred and forty-seven personnel completed the survey. Only 37% of respondents felt their training had equipped them to confidently manage births, with more experience with birth associated with higher confidence. Men and those who had not given birth were more comfortable providing analgesia to women in labour. Qualitative analysis identified four main categories: (1) Managing their own emotions, (2) Gender differences in views of unplanned births, (3) Managing interpersonal communication with women in labour, the family, and other health professionals, and (4) Views on pain management. The findings indicate that women in labour may be cared for differently depending on EMS clinicians' personal experiences, communication styles, and attitudes toward pain relief, highlighting the need for these providers to adapt their approach to meet the diverse needs of patients during these high-risk low frequency events.

Conclusion EMS personnel navigate a range of emotions and high-risk factors related to their patient and the environment during unplanned pre-hospital births, which may adversely affect their temperament and interpersonal communication. A perception of unclear pain relief guidelines and limited available options can exacerbate challenges. In NZ and overseas, multi-disciplinary training with midwives and integrating maternity and newborn care

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into postgraduate and ongoing professional development could support EMS personnel to confidently manage these events and improve patient outcomes.

Clinical trial number Not applicable.

Keywords Emergency medical services, Paramedic, Ambulance, Born before arrival, Unplanned birth outside institutions, Out-of-hospital births, Prehospital birth

In Aotearoa New Zealand (NZ), care throughout pregnancy, birth, and early post-partum is coordinated by a lead maternity carer (LMC), usually a qualified midwife. Most births (88% in 2022) occur in a hospital, approximately 4% are planned homebirths, and 8% are in midwife-staffed primary birthing units [1]. On occasion, emergency medical services (EMS) are dispatched to patients in labour who were not aware they were pregnant, have not enrolled with an LMC, or whose LMC has determined that emergency care or transfer to a higher-level medical facility is needed. Several studies indicate EMS involvement in prehospital births represent a small portion of their overall caseload; however, the births that they attend are commonly complex and challenging for both the clinicians and patients involved [2–4]. In response, strong demands are placed on EMS to perform a range of medical interventions for mothers and neonates in the out-of-hospital environment [5].

Several studies stress the importance of having skilled EMS at attendance of unplanned births, with a primary focus on having the appropriate equipment and education to manage maternal and neonatal complications [6, 7]. Less explored are the decision-making processes of EMS regarding administering analgesia to women in labour and how the emotions of women and clinical personnel are managed in these vulnerable situations. Effective communication has increasingly become acknowledged as a crucial component of high-quality healthcare in the pre-hospital setting [8, 9]. Qualitative studies in different birth settings indicate that the interpersonal communication women receive from health professionals significantly shapes their birthing experiences [10–12]. Interviews with 22 women in Queensland revealed that they attributed positive labour experiences to the interpersonal skills and empathy of the attending paramedics; in contrast, women felt powerless and distrusting of ambulance staff when they perceived disrespect during these interactions [11]. Other studies [13, 14] show the attitudes of EMS personnel during unplanned births affected women's comfort and satisfaction levels when engaging with ambulance staff [13, 14]. Furthermore, although a few studies have documented paramedics administering analgesia to women in labour [2, 3], none of these have explored EMS personnel's views of providing pain relief to these patients.

Hato Hone St John (HHStJ) provides ambulance cover to approximately 90% of NZ's population. In 2022, HHStJ personnel responded to 2,809 emergency calls related to obstetrics, unplanned out-of-hospital births, imminent labour, and birth complications. According to The Clinical Procedures and Guidelines followed by NZ EMS [15], there are no medications available for moderate to severe pain recommended in labour without caution. In general, use of opioid medications in labour is carefully balanced against known risks to the neonate, and their routine administration is discouraged by the New Zealand College of Midwives, particularly outside of a tertiary hospital setting [52]. Until 2017, Entonox (an inhaled analgesic with a 50/50 mix of nitrous oxide and oxygen) could be administered by all ambulance personnel except for first responders. It is still widely used for pain relief in labour and birth settings in NZ but is no longer carried by EMS. Methoxyflurane was a general anaesthetic in the 1960s and early 1970s, but its use declined due to dose-dependent nephrotoxicity [16]. At lower analgesic doses, methoxyflurane has been used in hospital and prehospital settings, including for labour and birth, without evidence of harm to the patient or neonate [16, 17]. For NZ EMS it is the first-line treatment for severe pain when opiates are not an option. However, there are limited prospective studies to formally establish its safety in pregnancy. Therefore, EMS personnel's decision to administer pain relief to women in labour is based on clinical reasoning with the support of experience and guidelines. It is not clear how the clinical decision-making process may be influenced by personal beliefs and attitudes due to a lack of literature exploring this topic during unplanned out-of-hospital-births, and none in NZ EMS.

This research explores the question: What are the perspectives of EMS personnel in NZ attending unplanned out-of-hospital births, particularly in relation to patient management? Our aims were to (1) identify how EMS demographics and professional experience related to their confidence and comfort in treating a patient in labour and (2) explore EMS' perspectives on managing emotional needs and administering analgesia in a labour and birth setting in NZ.

Methods

Participants and recruitment

HHStJ staff operate under three defined practice levels: emergency medical technicians (EMT; diploma or degree qualified), paramedics (degree qualified), and advanced paramedics (postgraduate qualification). First responders have no official practice level and are not authorised to autonomously administer medications with a small number of exceptions (mostly over-the-counter medications). They may be dispatched on ambulances or alerted to nearby incidents to provide basic emergency care. At the time of the survey, the HHStJ frontline workforce consisted of approximately 1,700 emergency medical technicians, 1,000 paramedics, 350 advanced paramedics, and 1,500 first responders. The NZ paramedic workforce is roughly 50% male and 48% female, with more males in management positions and higher representation of other genders at student level [18].

Participants were recruited through a convenience sample in October and November 2023. The weekly internal bulletin promoted an invitation to complete the survey to all HHStJ clinical personnel. The conceptualisation of the survey was informed by a prior internal audit that documented the medicines administered to women in labour by HHStJ personnel. To ensure content validity, the survey was developed in consultation with HHStJ Clinical Evaluation, Research and Insights team, incorporating their expertise in prehospital care and research methodology. The survey underwent pilot testing with a small group of clinical staff ($n = 8$) and academics ($n = 2$) to refine question clarity and overall reliability before distribution.

Data collection

Electronic surveys can be an effective and relatively inexpensive method to collect a wide range of experiences and views on a range of topics compared to conventional interviews [19, 20]. A survey (Appendix A) incorporating demographic, Likert scale, and free text questions was designed to include questions specific to this study as well as further questions for internal audit and research. The survey took an average of 34 min to complete, with response times ranging from 5 to 74 min. The survey was created and distributed using Corporate Microsoft® Forms, which also served as the platform for preliminary analysis and secure data storage on the HHStJ internal server.

Demographic data included age, gender, practicing location, practice level, and years of clinical experience. Participants were additionally asked if they had previously given birth themselves (optional response).

Participants indicated whether they had attended an out-of-hospital birth event while on duty, and if so, how many. Rating scales from 1 to 10 were used to assess how confident and informed the respondent either felt attending an unplanned birth (if they had been to one) or to treat a patient in labour, and how comfortable they were administrating pain relief medication to a patient in labour. They were also asked whether the training and education they received had equipped them to confidently manage these events (yes or no response).

Data analysed qualitatively for this paper were free text questions about participants' views on administering pain medication to women in labour, their emotions during these events, and their general confidence treating women during unplanned out-of-hospital births. Participants were asked to expand on their answers with questions such as, *"In your view, should patients in labour be administered pain relief? Explain why or why not."*, and *"Please describe your emotions and thoughts around attending childbirth emergencies."*

Data analysis

Quantitative data

Participant characteristics are presented descriptively. Questionnaire responses were compared based on participant characteristics using ANOVA for scale items and chi square for the education and training question (yes/no response). Statistical comparisons between participants who had previously given birth and those who had not were made excluding participants who chose not to answer the question. All statistical analyses were performed using SPSS v29 (IBM).

Qualitative data

Qualitative data were analyzed and reported in two parts. First, we used conventional qualitative content analysis [21–23] to understand the emotional needs of EMS personnel, their response to women's emotional needs, and their views on administering pain relief during unplanned out-of-hospital births. Second, the qualitative descriptive approach provided comprehensive summaries of everyday lived experiences in simple language, closely reflecting participants' accounts of events and their sentiments [24, 25]. In accordance with the content analysis approach, the first and last authors read over the participant responses several times to familiarise themselves with the data. Nvivo software (QSR International) was used by the first and last authors to code data with participants' words/emotions. Over several rounds of analysis, the first and last authors grouped codes with shared meaning patterns to reach consensus on the final categories.

Integration

The quantitative and qualitative analyses were carried out contiguously, and integrated using 'weaving' as described by Fetters et al. [26]. This involves integrating the

quantitative and qualitative findings narratively through their thematic connections as an opening to the discussion section of this article.

Ethics approval

In October 2023, the Northern B Health and Disability Ethics Committee of New Zealand approved this study as an amendment to the Aotearoa New Zealand Paramedic Care Collection (ANZPaCC, 2022 FULL 1315). Participants provided informed consent for their responses to be used for internal audit and for research. The process was guided by the New Zealand National Ethical Standards for Health and Disability Research and Quality Improvement [27].

Results

One hundred and forty-seven clinical personnel participated in the online survey. Approximately two thirds of participants identified as women, and the majority (78%) had attended an unplanned out-of-hospital birth while on duty (Table 1). Participants from a range of locations, age groups, clinical practice levels, and years of experience responded to the survey (Table 1).

Nearly half ($n = 64$, 44%) of participants gave a rating of 5 or below out of 10 when asked how confident and informed they felt to attend out-of-hospital births. Ratings were higher for participants with more years of clinical experience or who had previously given birth themselves, on average (Table 2). Participants who were female, had given birth themselves, or had not attended a birth event while on duty rated themselves as less comfortable giving analgesia to a woman in labour (Table 2).

Table 1 Demographics of participants

Category	Characteristic	*n* (%)
Sex	Female	97 (66%)
	Male	50 (34%)
Age (years)	20–30	40 (27%)
	31–40	33 (22%)
	41–50	32 (22%)
	51+	42 (29%)
Practice level	First responder	10 (7%)
	Emergency medical technician	55 (37%)
	Paramedic	60 (41%)
	Postgraduate qualified paramedic	16 (11%)
	Other	6 (4%)
Years of clinical experience	1–3 years	23 (16%)
	3–5 years	19 (13%)
	5–10 years	47 (32%)
	10 + years	58 (39%)
Location	Auckland	30 (20%)
	Other North Island	68 (46%)
	South Island	49 (33%)
Total participants		147

Participants with 5 or more years of clinical experience rated themselves as more comfortable giving analgesia to women in labour than those with fewer years of experience (7.5 vs. 6.6, F (1, 1) = [3.926], $p = .049$). Years of clinical experience did not differ between males and females in the study, $X^2(3, n = 147) = 1.54$, $p = .673$. Only 37% of respondents felt that the training and education they received had equipped them to confidently manage these events, with the lowest proportion in Auckland (20%) and the highest proportion in other parts of the North Island (46%) (Table 2).

Qualitative results

All participants provided a response to every free-text question, with responses ranging from 7 to 139 words. Responses were coded and grouped into four overarching categories.

Category 1: Managing own emotions

This category captured that in general EMS in this study felt anxious, stressed, scared, and nervous about attending unplanned out-of-hospital births due to the high expectations and vulnerability of these situations. These emotions were especially pronounced for participants that had prior adverse experiences with births while on duty or in their personal lives.

> *I found this job incredibly confronting and sought help from others to debrief this job. I personally do not want children for a myriad of reasons, and this made my personal feeling following this job challenging to manage. (Participant 97, Female, Paramedic).*

To maintain their composure and prevent alarming patients, several male clinicians described adopting a detached and reserved demeanour. These respondents felt putting their emotions to the side and exercising objectivity were key to effectively managing the situation, their interactions, and own emotions. This strategy often led participants to become hypervigilant, which helped them to anticipate potential risks in their surroundings; at times however, it veered them towards overthinking and catastrophizing negative outcomes.

> *Difficult to have any emotions when objectivity is what is required. Emotions cloud judgement. You have to switch them off in order to obtain the best possible outcomes for the two patients. (Participant 18, Male, Emergency Medical Technician)*

Participants' emotional response to an unplanned birth could be dramatically shaped by their own experience of having children. Some participants chose to share their perspective as parents, and described feeling much lower

Table 2 Comparison of participant ratings of confidence, comfort, and training by participant characteristics

	n	Informed and confident		Comfortable giving analgesia		Enough training	
		m (SD)	p	m (SD)	p	Yes response n (%)	p
Total	147	5.6 (2.1)		7.2 (2.4)		54 (37)	
Sex			0.975		**.020**		0.210
Female	97	5.7 (2.0)		6.9 (2.5)		32 (33)	
Male	50	5.7 (2.3)		7.9 (2.2)		22 (44)	
Age (years)			0.527		0.115		0.780
20–30	40	5.2 (2.1)		7.7 (1.8)		15 (38)	
31–40	33	5.8 (1.8)		7.8 (2.5)		14 (42)	
41–50	32	5.8 (2.3)		6.8 (2.6)		12 (38)	
51+	42	5.7 (1.9)		6.7 (2.6)		13 (31)	
Practice level			0.327		0.318		0.890
First Responder	10	4.8 (1.9)		6.1 (3.1)		4 (40)	
EMT	55	5.5 (2.2)		7.0 (2.7)		19 (35)	
Paramedic	60	5.6 (2.0)		7.4 (2.1)		23 (38)	
PQP	16	6.5 (2.1)		8.0 (2.2)		7 (44)	
Other	6	5.6 (2.3)		7.0		1 (20)	
Years of experience			**0.027**		0.119		0.381
1–3 years	23	4.9 (2.3)		6.7 (2.8)		8 (35)	
3–5 years	19	4.7 (2.6)		6.5 (3.1)		4 (21)	
5–10 years	47	5.9 (1.7)		7.9 (1.9)		17 (36)	
10 + years	58	6.0 (1.9)		7.2 (2.3)		17 (36)	
Location			0.909		0.175		**.044**
Auckland	30	5.7 (1.8)		7.8 (2.0)		7 (23)	
Other North Island	68	5.7 (2.2)		7.3 (2.5)		32 (47)	
South Island	49	5.5 (2.1)		6.8 (2.5)		15 (31)	
Previously given birth			**0.021**[a]		**0.034**[a]		.856[a]
Yes	60	6.1 (1.8)		6.8 (2.5)		21 (35)	
No	85	5.3 (2.2)		7.6 (2.2)		31 (37)	
Prefer not to say	2	4.0 (2.8)		4.0 (2.8)		2 (100)	
Attended birth			.554[a]		**0.014**[a]		.687[a]
Yes	114	5.7 (2.1)		7.5 (2.3)		43 (38%)	
1–3	57	5.5 (2.2)		7.4 (2.2)		23 (43%)	
4–7	30	5.4 (1.8)		7.2 (2.6)		10 (19%)	
8–10	8	7.1 (1.0)		7.2 (3.1)		2 (4%)	
10+	19	6.0 (2.3)		8.3 (1.7)		8 (15%)	
No	33	5.4 (2.1)		6.3 (2.7)		11 (33)	

EMT: Emergency Medical Technician, PQP: Postgraduate Qualified Paramedic. [a] p value for yes vs. no response. Bold type indicates significance at the $p < .05$ level.

anxiety and fear levels attending unplanned birth events after the birth of their own child.

> *Since giving birth myself, I feel more confident in my ability to help other mums through the process. Before I had children, I pretended to be confident, but really wasn't. (Participant 2, Female, First Responder)*

> *In earlier days (pre myself having a son of my own) attending unplanned birth in the community would be confronting on an anxiety level … Now I am more comfortable with unplanned births as having the journey of my own family I now have an appreciation and reduced anxiety. (Participant 57, Male, Paramedic)*

Category 2: Gender differences in views of unplanned births

Many participants referred to gender as a factor that could affect patient care. Both male and female participants perceived that women in labour would be more comfortable with a female EMS leading the job or taking the more hands-on role. Frequently, male clinicians described feeling "awkward" or "out of [their] comfort zone" and considered their female counterparts to be more naturally suited to responding to women in labour, irrespective of their qualifications or experience. In the same light, a few female participants shared times when

they were pressured to lead or pushed to the front when attending unplanned out-of-hospital births, despite their own discomfort or limited experience with them:

> *I feel that childbirth is quite a female oriented process, noting that midwives are near exclusively female (and have the term 'wife' in their occupation title). As a male, dealing with a stranger's vagina in the context of childbirth is a frightening concept. (Participant 80, Male, Emergency Medical Technician)*

> *As a female officer, I was often pushed to be the lead clinician, even if the male officer was a higher ATP [authority to practice]. (Participant 1, Female, Paramedic)*

On the other hand, though almost all women perceived these events as a major responsibility, many felt it was rewarding, joyous, and exciting to assist with bringing new life into the world. When asked to describe which factors contributed to their confidence when attending unplanned births, both men and women often felt encouraged by their personal experiences with birth:

> *I'm a father, delivered my own granddaughter, am continuing education to postgraduate which includes obstetrics. (Participant 94, Male, Paramedic)*

Category 3: Managing interpersonal communication

This category captures the myriad factors EMS must consider when responding to unplanned birth events, with the primary focus usually the person in labour. A few respondents described gaining the trust of women and providing them with reassurance as central aspects of negotiating the tone of the situation. This was particularly important when patients had not anticipated imminent birth and were anxious that their birth plan had been derailed. Furthermore, when neonatal death occurred, participants described being unsure on how to counsel patients or respond to women's emotional needs. This concern was followed by trying to maintain the mother's dignity and privacy in compromising situations such as when birth occurred in a public place. A reoccurring challenge EMS also reported was difficulty communicating clearly with the mother and attempting to obtain important information from them about how they felt and what they needed:

> *One of the biggest challenges is gaining the trust of the expectant mother. Given we are not maternity experts or trained LMCs [lead maternity carer] they are quite anxious without their LMC's present. (Participant 8, Male, Emergency Medical Technician).*
> *There is always a blank of what to say to people when it comes to a still birth. Participant 18, Male, Emergency Medical Technician)*

Responding to the needs of additional family members alongside the woman in labour compounded the level of anxiety faced by EMS during these events. Juggling the extended family's emotions heightened logistical complexity, especially during patient transportation, and increased pressure on EMS to ensure the birth went smoothly and with limited complications to the mother and neonate:

> *Managing emotions of women and high emotions from the family affecting clinicians. I feel like we could easily become distracted trying to emotionally calm everyone in the situation and let our clinical assessment and treatment slip. (Participant 54, Male, Paramedic)*

When the midwife was available via phone or present on scene, it was critical that EMS communicated with them effectively. Many participants felt that when the lead maternity carer (LMC) led the situation, their efforts were better coordinated, and complications were managed more smoothly.

> *We attended the birth literally seconds after the baby had been delivered. A midwife arrived moments after us and was the main carer for both the baby and the mother. The midwife had forgotten her equipment and as such all the equipment required was sourced by me and colleagues … A second midwife arrived and took over care of the mother. All in all, the two midwives retained care of the patients and me and a colleague assisted with this process, taking direction from the midwives and engaging in clinical discussion. The outcome was positive, and both patients were transported to hospital. (Participant 67, Male, Paramedic)*

A few, however, reflected that when there was miscommunication or difference of opinion between the health professionals, decision-making was challenging, and stress levels were raised for EMS. In a few circumstances, tension between the midwife and clinical personnel resulted in delaying the transportation of patients or missed signs of risk during labour or imminent birth:

> *With LMC present, it's usually a delay in progression and a heightened "panic" situation as it is stressful for both the patient and family and staff.*

Without the LMC, its usually a lot more relaxed as it's either a straightforward birth or transport is not delayed. (Participant 93, Female, Paramedic)

Category 4: Views on pain management

For the most part, respondents believed pain relief should be offered to women in labour and that the patients' preferences should be respected, but personal attitudes and beliefs around the suitability of available analgesia differed among respondents. Many participants felt labour pain should not be distinguished from other forms of pain, which was seen as an important indicator of how the patient felt and should be treated appropriately. Most participants were comfortable providing pain relief within their scope of practice or said they would consult the LMC or HHStJ clinical support for advice or reassurance if unsure. However, a handful of participants expressed concerns around the lack of research around the safety of using analgesics during labour and worried about potential effects on the foetus/neonate. A few also noted a lack of knowledge around contraindications in these situations and didn't feel pain relief available to EMS was appropriate to use for obstetric events:

I routinely administer my patients methoxyflurane for analgesia as required. Pain relief not only provides overall relief for an anxious and distressed laboring mother, but it can also assist with assessment of the patient. (Participant 67, Female, Paramedic)

My concern is the impact on the baby regarding respiratory effort and other unknown implications due to the lack of ethical studies on the side effects on baby. (Participant 47, Male, First Responder)

When asked which factors influenced the decision to administer pain relief during labour or not, most considered the mother's level of discomfort, drug contraindications, the birth plan, the LMC's advice, the patient's medical history, and the risk of complications. Many respondents felt it was important to explain the risks of analgesia to patients even if they requested it.

Low level doses of pain relief medication can be administered; however, ambulance officers need monitoring equipment and specific training in this area to ensure the mother and neonate are not overmedicated and the process of childbirth/delivery is not compromised. (Participant 24, Male, Paramedic)

While most participants were confident in administering methoxyflurane (an inhaled analgesic) and understood its risk profile, a significant portion voiced a preference for Entonox, which is no longer carried by EMS in NZ, perceiving it as both more effective and safer for obstetric events.

Discussion

Summary and integration of quantitative and qualitative results

This study described EMS personnel's confidence to manage unplanned births and administer analgesia to women in labour and explored their views on these topics as they balanced the needs of their patients, themselves, and others on scene. Our study participants described a heavy mental load beyond clinical care as they negotiated their own emotions while simultaneously drawing upon communication skills to gain the patient's trust, manage the scene, and work with other health professionals. Only 37% of participants felt they received enough training and education to confidently manage out-of-hospital birth events, and self-confidence ratings were higher for EMS who had previously given birth themselves or had more years of clinical experience. Participants generally described being comfortable giving analgesia to women in labour but rated themselves lower on this questionnaire item if they were female, had previously given birth, or had not attended a birth event while on duty before. Gender differences were seen both in the way participants approached these challenging scenarios, and in the roles they took or were expected to take as clinicians.

Feelings of fear and anxiety were common among study participants, which was reflected in the low self-confidence ratings given by a large proportion of participants (44%). Some male participants described using a detached, clinical communication style to manage their emotions and keep patients and their families calm during obstetric emergencies. Such coping strategies are well-documented by paramedics attending critical incidents, who report using detachment to help them focus on medical care without clouded judgement, and to protect them from overwhelming or psychologically damaging feelings [28, 29]. However, this may be at odds with patient expectations about the interpersonal role of EMS during crisis situations [30], and women may perceive these interactions with ambulance staff to be sterile or unpleasant as other studies have observed [8, 11, 21].

Women and those who had given birth previously rated themselves as less comfortable administering pain medication to women in labour, while other participant characteristics did not appear to be associated. Though some participants articulated concern about potential effects of medications on the foetus, qualitative data did not provide further insight into gender differences, and the study was not powered to perform secondary analyses on subsets of data.

General discussion

Our findings highlight the complex decision-making process EMS navigate when providing pain relief during prehospital labour. While clinical guidelines and patient preferences play a role, clinicians must also balance safety considerations, medical history, and professional judgement. The preference for Entonox among some participants suggests a need for further evaluation on the availability of analgesic options for women in labour in ambulance settings.

Previous studies suggest women receive mixed communication from ambulance staff during out-of-hospital labour [11, 13, 14]. A consistent body of literature indicates negative interactions between clinical staff and patients during these events can be traumatic for the pregnant women [31] and many want better quality care from healthcare providers during obstetric events [32]. As in previous research, participants in our study stressed the importance of respecting the patient's wishes [11, 33, 34] and building trust with them, which included respecting women's relationships with their LMC and protecting their dignity in public locations [35, 36]. A handful of studies have associated calm interpersonal communication styles by paramedics with warmer and friendlier interactions with women during labour [34, 37].

Female respondents in our study conveyed sentiments of both excitement and worry when attending prehospital births. This finding aligns with a previous study that found female ambulance clinicians experience a mixture of "fear and delight" ([38], pp 47) when responding to obstetric events. Some clinicians articulated a gender bias in their responses by suggesting female personnel were more naturally suited to leading care of a patient in labour than their male colleagues. Correspondingly, some junior female personnel and women unfamiliar with birth described instances of feeling pressured to lead obstetric events by their male colleagues.

Few studies have examined a clinician's sex or gender in relation to their perspectives on administering pain relief. However, a Canadian study reported that male prescribers were more comfortable with prescribing and adjusting prescriptions for chronic pain [39], whereas in a US emergency department setting, female physicians were more likely to prescribe analgesia to patients in pain [40]. Labour is a unique setting where clinician and patient philosophies can differ widely on the benefits or need for analgesia, but in general, prior literature indicates patients' pain may be underrecognised, underestimated, and undertreated in the pre-hospital setting [41, 42]. This particularly affects women [43–45], who correspondingly receive less analgesia in out-of-hospital and emergency department settings than men [44, 46–49].

Flanagan et al. [50] argue that providing emotional support to birthing women is a crucial aspect of woman-centred care, but suggests interpersonal communication may be overlooked in traditional paramedic training in favour of technical capability. We concur with previous calls for an increased focus on maternity and newborn training for EMS, and suggest the inclusion of strategies for addressing anxiety and stress to support EMS mental health, interpersonal communication, and potentially reduce risks to patient safety during high-risk, low frequency obstetric events [6, 7, 28, 51]. Because they are rarely required when labour and birth are progressing normally, ambulance personnel are unlikely to be familiar with typical birth unless they have experienced it in their own lives. Ensuring practice requirements and shift rosters are not barriers for parents to return to work would help to retain a segment of the workforce with experience and confidence to overcome some of the major barriers to providing high-quality care in this challenging setting.

Recommendations for the NZ context

While most EMS in our study described feeling relieved when the LMC was present to provide patient-specific information or guidance, some described tension or disagreements about patient care or transport. EMS frequently interface or collaborate with other healthcare and emergency professionals, and factors such as hierarchy, gender, and protecting their turf have been described as barriers to successful collaborative working [52]. Clashes often occur when practice guidelines are not in alignment and roles are not clearly articulated, while communication, reciprocity, respect, and professional acknowledgement can facilitate cooperation [52]. In Australasia, a recent document analysis highlighted a misalignment between the Clinical Practice Guidelines by which ambulance services take standing orders and best practice recommendations for obstetrics and neonatal care published by the Royal Australian and New Zealand College of Obstetrics and Gynaecology [53]. The authors advocate for clearer clinical guidance for paramedic management of obstetric and neonatal presentations harmonised with evidence-based recommendations and international best practice standards [53].

In EMS practice guidelines, there is no specific guidance for pain relief in labour, and general principles for analgesia apply [15]. For severe pain, EMS carry methoxyflurane (EMT practice level and above) and fentanyl (paramedic practice level or above) as usual first-line medications. Fentanyl is not recommended if birth is imminent due to the potential for respiratory depression for the neonate, giving it limited utility for births most often attended by EMS [54]. Methoxyflurane has been used by NZ EMS for decades, but its role in pre-hospital pain management increased with the removal of Entonox

from CPGs in 2017. Guidelines state that methoxyflurane 'may be administered' in pregnancy, but that 'administration should be discussed with the lead maternity carer if there are known signs of foetal distress' [15]. EMS in our study often described incidents where treatment plans had to be made without input from an LMC or a detailed patient history, indicating that clearer recommendations may be beneficial to support confident decision making.

Methoxyflurane appears to be effective for managing acute pain, with adverse effects limited to prolonged or repeated risk [55]. The drug's safety is well established at analgesic doses, but there is little recent research on its use in pregnancy [16, 17]. A retrospective study over 17 years demonstrated no associations between pre-hospital methoxyflurane administration in pregnancy and neonatal outcomes [17]. Compared to those treated with methoxyflurane, women who had no analgesia on the day of delivery had higher odds of foetal distress, neonatal resuscitation, and perinatal mortality, suggesting EMS personnel recognised and were less likely to administer methoxyflurane to higher-risk patients. EMS in NZ follow the NZ Code of Health and Disability Services Consumers' Rights, which outlines a patient's right to informed choice in treatment. Methoxyflurane is rarely used outside the prehospital setting in NZ, and to our knowledge is not included in information from childbirth educators and healthcare services about pain relief options during labour (e.g [56]). Although few women are under EMS care during labour, antenatal care services should consider how this gap in antenatal education could be addressed to support informed decision making for their clients during birth.

Interprofessional training between paramedics, midwives, and other birth centre and hospital staff was successful in enhancing collaboration and communication during emergency birth transfers in the US, as well as increasing paramedics' knowledge about birth emergencies and their management [57]. Similar cross-disciplinary training could likely be adapted to the NZ context to improve understanding for midwives and EMS about each other's roles and scope of practice in birth emergencies and to support interprofessional working in the field. Furthermore, we support recent UK service review recommendations to integrate maternity and newborn training in into higher education training and continuous professional development for EMS to equip them with the skills and knowledge needed to address unplanned out-of-hospital events confidently, including stillbirth and neonatal death [6]. Scores in this study provide a useful baseline for evaluating the effects of upskilling.

Limitations

Though the Internet-based format and convenience sampling enabled data collection from a demographically diverse group of participants (i.e. a wide range of ages, locations, and years of clinical experience) and rich descriptions in the free text open-questions, it limits the generalizability of the quantitative results to the EMS workforce. Furthermore, virtual surveys may not elicit the same level of detail in responses that in-person qualitative interviews could provide. Though responses to the survey were anonymous, it was transparent to participants that the survey authors were HHStJ employees, which may have resulted in a social desirability bias. However, the candid nature of many responses indicated that participants may have seen the survey as an opportunity to voice issues that affected them as frontline staff to their employer. The high representation of female participants in our sample may reflect the self-selection nature of our participation recruitment approach with more women than men declaring an interest in obstetrics. This survey was open until thematic saturation was reached; however, we acknowledge that extending the survey time may have garnered more responses and unexplored themes. This study did not collect ethnicity data, limiting analysis of potential cultural or racial influences on EMS' perceptions of pain management and responding to unplanned births.

Conclusion

This study demonstrates that EMS-attended births are often difficult and anxiety-provoking for ambulance personnel, many of whom feel underprepared to confidently manage them. In our study, clinicians aimed to fulfil women's expectations to be supported emotionally and treated respectfully as well as having their clinical needs met within high-stress and complex environments. Prior personal and professional experiences with birth were associated with self-confidence, and some clinicians described strategies to manage their emotions to prioritise the needs of the patient. Ambulance personnel placed importance on respecting women's choices and addressing their pain needs, though a small number raised concerns about availability of suitable analgesics and safety for the foetus. Participants supported LMCs when present, but sometimes had difficulty clearly communicating individual roles and best practices. We identified multi-disciplinary team training with midwives as an opportunity to improve EMS personnels' confidence and communication between health professionals during emergency birth events. While participants anticipated birth complications and recognised multiple stressors, many felt privileged to help bring new life into the world and joyful when the birth went smoothly. Issues raised by EMS in this study relating to gendered roles in emergency birth settings and comfort with administering analgesia to women in labour warrant further investigation.

Abbreviations

EMS	Emergency medical services
HHStJ	Hato Hone St John
LMC	Lead maternity carer
NZ	Aotearoa New Zealand

Supplementary Information

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Supplementary Material 1

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Author contributions

All authors contributed to conceptualisation and planning of the study. VW and SM carried out analysis and interpretation of results. VW and SM wrote the manuscript with review and editing by all authors. All authors read and approved the final manuscript.

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Data availability

Datasets generated and analysed are not publicly available because they contain potentially identifying information about participants. Participants were assured that responses shared as part of this study would remain confidential and would not be published in a potentially identifiable format.

Declarations

Ethics approval and consent to participate

This study was approved by the Northern B Health and Disability Ethics Committee of New Zealand in October 2023 as an amendment to the Aotearoa New Zealand Paramedic Care Collection (ANZPaCC, 2022 FULL 1315). The study adheres to the Declaration of Helsinki. Participants provided informed consent to publication of their data in a de-identified format. No identifying patient or clinician information is included in this publication.

Competing interests

VW, BD and SM are employed by Hato Hone St John. The remaining authors declare that they have no competing interests.

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