

RESEARCH REPORTS

DIAGNOSIS FEEDBACK: A PROSPECTIVE SURVEY ON PARAMEDIC PERSPECTIVES AND CLINICAL IMPACT

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ABSTRACT

Introduction: Paramedics rarely receive formal feedback on patient outcomes following handover, despite evidence that such information may support learning, confidence, and reflective practice.

Objective: To evaluate whether emergency department (ED) diagnosis feedback influences paramedics' perceived sense of closure, confidence managing similar cases, reflective practice, and perceived diagnostic skill.

Methods: This prospective, predominantly quantitative survey was conducted among paramedics in a mid-sized urban setting, between April and December 2018. Paramedics who requested their patient's final ED diagnosis (n = 317) were provided with diagnosis feedback and invited to complete online surveys at one week and three months. Quantitative data were analyzed descriptively, and optional free-text responses were reviewed to identify recurring themes.

Results: Of the 317 paramedics who received diagnosis feedback, 46.4% completed the one-week survey and 32.2% completed the three-month survey. At one week, 86% reported a sense of closure about the call, and over 80% agreed that feedback increased their confidence for similar cases and prompted clinical reflection. At three months, 91% reported improved differential diagnostic skills, and 96% stated they would use feedback regularly if available. A minority reported added stress or anxiety when their field impression differed from the ED diagnosis. Qualitative comments reinforced these results, describing feedback as a helpful educational tool that provided confidence and closure.

Conclusion: Paramedics perceived ED diagnosis feedback as a valuable educational tool that may support reflective practice, confidence managing similar cases, and perceived diagnostic skill. These findings suggest that structured diagnosis feedback may serve as a meaningful component of paramedic professional development.

INTRODUCTION

Paramedics are frontline emergency medical services (EMS) clinicians who make high-stakes decisions in fast-paced, out-of-hospital environments (Rowland & Brydges, 2023). In Canada alone, more than 30,000 licensed paramedics respond

to emergencies each year, often delivering time-critical interventions that improve morbidity and mortality in conditions such as cardiac arrest and sepsis (Kotnarin et al., 2023; Lee et al., 2020; Rowland & Brydges, 2023; Varney et al., 2022). Paramedics rarely receive feedback on their performance or how closely their prehospital clinical impressions match the eventual in-hospital diagnosis, despite their crucial role in patient care (Cash et al., 2017; Kästner et al., 2025; Missel et al., 2023; Wilson et al., 2022, 2024). As the profession evolves, national paramedicine guidelines call for a culture of ongoing learning and routine evidence-based practice, backed by coordination between hospitals and EMS (Tavares et al., 2022). To address this gap, structured feedback mechanisms are increasingly recognized as essential for continuous quality improvement and are becoming integral to EMS professional development and training standards (Gunderson et al., 2021).

Growing evidence demonstrates that paramedics both value and would benefit from patient diagnosis feedback (Kaduce et al., 2024; Schneider et al., 2026; Wilson et al., 2024). In a survey of 428 EMS personnel, 95.4% stated they would welcome patient diagnosis feedback, and 94.7% perceived it as helpful for their clinical work (Kästner et al., 2025). Moreover, over 80% believed it would increase their clinical confidence, self-evaluation, and experience to respond to future calls. Formal feedback systems, in particular, provide paramedics visibility into patient outcomes and have been shown to foster meaningful personal and professional growth (Brandling et al., 2019; Budworth et al., 2023). Yet routine delivery of such feedback often falls short due to privacy regulations and separate hospital and EMS data systems, among other systemic challenges (Klausen et al., 2023; Melaika et al., 2022; Snowsill et al., 2023). As a result, to gain closure and learn from cases, paramedics often pursue patient outcomes informally, whether by later inquiring at the treating hospital or discussing cases with peers (Kästner et al., 2025; Missel et al., 2023). These informal pathways often depend on individual initiative and have been cited as barriers to patient care improvement and enhanced decision-making (Brunton et al., 2019; Eaton-Williams et al., 2020b; Keimer et al., 2023; Schneider et al., 2024; Wilson et al., 2023). Despite growing recognition of its importance, few studies have explored how paramedics perceive structured diagnosis feedback over time or how such feedback may influence ongoing clinical development.

This study piloted a simple, structured feedback process and assessed paramedics' interest in receiving patient diagnosis information, with follow-up at one week and three months. The objective was to evaluate how receiving emergency department (ED) diagnosis feedback influences paramedics' perceived closure, confidence, reflective practice, and clinical assessment at one week and three months.

METHODS

STUDY DESIGN

This prospective study with an integrated qualitative component was conducted between April and December 2018. Paramedics completed a paper-based baseline survey before an ED patient handover and were subsequently invited to complete two web-based follow-up surveys at one week and three months. Quantitative data were collected using structured, closed-ended items, and qualitative data were obtained through optional free-text fields. Participation was voluntary, and all responses were de-identified prior to analysis.

STUDY SETTING

The study was conducted in an urban center in Ontario, Canada (population approximately 415,000 during the study period), at two adult tertiary-care emergency departments with a combined annual census of 106,000 patients. All participating paramedics were employed by a single paramedic service, the region's sole land EMS agency, which responded to over 60,000 calls annually and employed 331 paramedics in 2018. This agency includes both primary care paramedics (PCPs) and advanced care paramedics (ACPs). PCPs are trained to deliver essential prehospital care, focusing on stabilization and initial treatment, while ACPs have additional training that builds off the PCP scope, allowing for more complex procedures and pharmacologic management in the field. Paramedics were introduced to the study during a staff education session, where they received written study information and had the opportunity to ask questions.

PARTICIPANTS

Eligible participants were active-duty paramedics involved in the direct care, transport, and handover of adult patients to one of the participating EDs during study hours. Paramedics were approached in the ED patient offload area prior to triage and before patient handover whenever feasible, using a convenience sampling strategy. Recruitment was conducted by PCPs employed by the same EMS agency who held peer-level roles and did not have supervisory authority over participants. Paramedics were eligible to enroll for each qualifying patient encounter during recruitment periods. The total number of eligible patient encounters was not systematically recorded. Inclusion criteria required employment with the participating EMS agency, involvement in the direct transport of an adult patient to a participating ED, and the ability to provide written informed consent before triage. Paramedics were excluded if they transported a Canadian Triage Acuity Scale Level 1 patient, transported to the pediatric ED, transported under an alternative destination or bypass protocol (e.g., obstetrics bypass, ST-elevation myocardial infarction bypass, stroke bypass, etc.), or transferred patients between facilities for a known diagnosis and disposition (e.g., direct transfers to a floor, transfers from urgent care, etc.). Paramedics were also excluded if they reported receiving diagnostic information prior to completing the survey. Paramedics who had previously provided written consent during the training session were re-confirmed for participation at recruitment. Ethics approval was obtained from an institutional research ethics board (REB). The sharing of outcome information with paramedics for quality improvement and educational purposes was permitted under provincial privacy legislation; individual patient consent was waived by the REB, as the study involved analysis of hospital outcome data shared with paramedics in de-identified form and did not involve direct patient contact.

INTERVENTIONS

The study procedure consisted of a structured diagnostic feedback process supported by three sequential surveys. After an eligible patient encounter, consenting paramedics completed the baseline paper survey (Survey #1), which asked them to document their suspected patient diagnosis. Within approximately one week of the encounter, the research team retrieved the final ED diagnosis and disposition from hospital records. A de-identified diagnostic summary was sent to the paramedic via email in accordance with institutional privacy policies. This feedback email contained a link to a one-week

follow-up survey, which assessed immediate reflections on the diagnostic feedback. At three months, paramedics were emailed a link to the final follow-up survey, regardless of whether they had completed the one-week survey. Figure 1 illustrates the recruitment and follow-up process.

Participant flow is shown from consent ($n = 317$) to completion of the one-week ($n = 147$) and three-month ($n = 102$) follow-up surveys. A total of 170 and 215 participants did not complete the one-week and three-month surveys, respectively.

OUTCOME MEASURES

The one-week survey evaluated the paramedics' sense of closure, confidence managing similar cases, and reflections on call management. The three-month survey assessed perceived longer-term effects on differential diagnostic skills, perceived educational value, willingness to routinely receive such feedback, and emotional responses to diagnostic discrepancies. Demographic information (PCP/ACP; years of experience) was collected in the three-month survey. All structured items used a five-point Likert scale ranging from "strongly agree" to "strongly disagree." The final survey included an optional free-text field for additional comments regarding the feedback process. Survey items were developed by the multidisciplinary research team based on existing literature examining EMS feedback systems and personal knowledge of the local systems. The survey instrument was developed specifically for this study and had not undergone prior formal validation.

DATA COLLECTION

Paper baseline surveys were collected immediately after completion and assigned unique study identifiers. Follow-up surveys were distributed electronically using SurveyMonkey®. Ambulance call report numbers were recorded to allow linkage between surveys and ED outcomes, and identifiers were removed from the analytic dataset during data preparation. All data were stored on secure, password-protected institutional servers, with personal identifiers maintained separately from analytic files.

DATA ANALYSIS

Quantitative data were analyzed descriptively using IBM SPSS Statistics 19.0 (IBM Corp., Armonk, New York, USA). Frequencies and percentages were calculated for all closed-ended responses using the total number of responses for each survey as denominators. Missing data were rare and not imputed. Likert-scale items were collapsed into agree, neutral, and disagree categories for reporting. Free-text responses were analyzed using descriptive content analysis. One investigator identified recurring themes, which

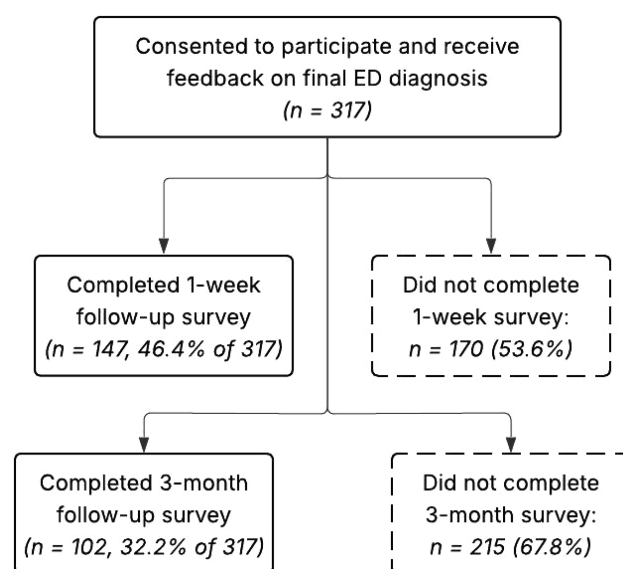


Figure 1. Flow diagram illustrating participant recruitment and follow-up survey completion.

were subsequently reviewed and refined through discussion with two additional investigators to achieve consensus.

RESULTS

A total of 317 paramedics consented to participate in the study and receive ED patient diagnosis feedback. Of these, 46.4% (147/317) completed the one-week follow-up survey, and 32.2% (102/317) completed the three-month survey. Because follow-up survey responses were analyzed in de-identified form and could not be linked across time points, longitudinal comparisons between the one-week and three-month surveys were not feasible.

At the one-week follow-up ($n = 147$), most respondents agreed that receiving patient diagnosis feedback helped them feel closure about the call (85.7%, 126/147) and increased their confidence in managing similar calls in the future (81.6%, 120/147). Feedback prompted reflection on call management for 79.6% (117/147), although 7.4% (11/147) disagreed. Neutral responses across items ranged from 11.6% to 15.6%, and disagreement was uncommon (two or fewer respondents per item). At the three-month follow-up ($n = 102$), most participants reported improved skills in forming differential diagnoses (91.2%, 93/102), agreed they would use diagnosis feedback as a learning tool if routinely available (96.1%, 98/102), and regarded it as a valuable educational resource in paramedicine (97.0%, 99/102). Neutral responses ranged from 2.0% to 7.8%. Regarding emotional impact, 10.8% (11/102) reported increased stress or anxiety when the ED diagnosis differed from their field impression, while 62.7% (64/102) disagreed and 25.5% (26/102) were neutral. Survey responses are summarized in Table 1.

Survey Item	Agree or Strongly Agree <i>n</i> (%)	Neither Agree nor Disagree <i>n</i> (%)	Disagree or Strongly Disagree <i>n</i> (%)	Did Not Answer <i>n</i> (%)
1-week follow-up ($n = 147$)				
Learning about my patient's outcome has helped me feel closure about the call.	126 (85.7%)	17 (11.6%)	2 (1.4%)	2 (1.4%)
After receiving information about my patient's diagnosis, I believe I will have an increased level of confidence when managing a similar case in the future.	120 (81.6%)	23 (15.6%)	1 (0.7%)	3 (1.4%)
Receiving information regarding my patient's diagnosis has caused me to reflect on the way the call was handled.	117 (79.6%)	19 (12.9%)	11 (7.4%)	0 (0)
3-month follow-up ($n = 102$)				
Learning about my patient's outcomes has been beneficial to me as a clinician, as it has helped me improve my differential diagnostic skills.	93 (91.2%)	8 (7.8%)	1 (1.0%)	0 (0)
If information regarding patient diagnosis was made available to me on a regular basis, I would utilize it as a learning tool.	98 (96.1%)	2 (2.0%)	1 (1.0%)	1 (1.0%)
Receiving information regarding patient diagnosis is useful as an educational tool in the field of Paramedicine.	99 (97.0%)	3 (2.9%)	0 (0)	0 (0)
The possibility of learning there might be a difference between my impression of a patient's problem and the Emergency Department's diagnosis has caused an increase in my occupational stress/anxiety.	11 (10.8%)	26 (25.5%)	64 (62.7%)	1 (1.0%)

Table 1. Survey item responses at one-week and three-month follow-up.

Demographic data were available for the 102 participants who completed the three-month survey. Among them, 74.5% (76/102) held PCP certification, and 25.5% (26/102) were ACPs. Participants represented a wide range of experience levels: 33.3% (34/102) had 5 or fewer years of experience, 21.6% (22/102) had 6-10 years, 16.7% (17/102) had 11-15 years, 6.9% (7/102) had 16-20 years, and 20.6% (21/102) had more than 20 years of experience.

Twenty-two of the 102 respondents (21.6%) provided open-ended comments. Recurring themes included enhanced confidence and closure, educational value and skill development, and support for continued implementation of diagnostic feedback.

DISCUSSION

INTERPRETATION

This study found that structured diagnostic feedback was consistently perceived as helpful for understanding patient outcomes, encouraging reflective practice, and increasing confidence in managing similar cases, with these perceived effects persisting at three months. Qualitative comments supported these observations and emphasized feedback as a useful tool for personal and professional development. Only a minority of participants reported stress or anxiety when their initial impression differed from the ED diagnosis, suggesting that diagnostic feedback was generally viewed as constructive.

Despite data being collected in 2018, the core issues discussed in this study, including paramedic access to diagnostic outcome feedback and its perceived educational value, remain relevant to contemporary EMS practice. By integrating both quantitative and qualitative data, this study offers a more nuanced understanding of how paramedics experience diagnostic feedback within a single EMS system. The inclusion of a three-month follow-up also provided insight into how perceptions of feedback may evolve over time.

PREVIOUS STUDIES

Findings align with international literature demonstrating strong paramedic interest in receiving outcome feedback. Prior work in Canada, the United States, and the United Kingdom has shown that structured feedback systems are well received and may enhance decision-making confidence and perceived clinical performance (Brandling et al., 2019; McGuire et al., 2025; Pollard et al., 2015; Snowsill et al., 2023; Sommers et al., 2019). For example, a U.S. peer review and outcome feedback system providing EMS clinicians with case summaries and areas for improvement was associated with enhancements in patient assessment and treatment decisions (McGuire et al., 2025). Similarly, condition-specific pathways, such as stroke and cardiac care systems, have demonstrated educational value (Lally et al., 2020; Morrison et al., 2017; Oostema et al., 2019; Siriwardena et al., 2014; Steiner et al., 2023). The Canadian Strategic Management of Acute Reperfusion and Therapies in Acute Myocardial Infarction program, which uses an electronic audit-and-feedback loop for myocardial infarction cases, has been associated with improved awareness of ECG-to-reperfusion times (Morrison et al., 2017). In the U.K., the Paramedic Acute Stroke Treatment Assessment project reported improved stroke recognition and smoother handovers following the introduction of immediate feedback during pilot implementation (Lally et al., 2020).

The manner in which feedback is delivered appears central to its effectiveness. Paramedic feedback perceived as criticism can undermine confidence and provoke negative emotional reactions such as frustration or blame (Brunton et al., 2019; Eaton-Williams et al., 2020b; Morrison et al., 2017; Wilson et al., 2024). By contrast, systems designed to provide supportive, requested feedback are associated with improved morale and stronger educational outcomes (Budworth et al., 2023; Cash et al., 2017; McGuire et al., 2021; Snowsill et al., 2023). These findings align with the generally positive reception reported in this study.

System-level barriers remain a major challenge for widespread feedback implementation. EMS and hospital systems often function in silos with limited data integration (Eaton-Williams et al., 2020a; Klausen et al., 2023). Electronic health records could bridge the gap, yet current interfaces are not integrated enough to enable effective data exchange (Porter et al., 2020). Privacy regulations and their interpretation may further restrict data sharing across organizations (Keimer et al., 2023; Melaika et al., 2022). In Europe, the General Data Protection Regulation is often cited as a barrier; in the U.S., uncertainty about the Health Insurance Portability and Accountability Act can lead some hospitals to limit disclosure (Gunderson et al., 2021; Melaika et al., 2022). Some EMS agencies now appoint privacy officers to negotiate data access (Gunderson et al., 2021). Operational realities compound these issues, as the nature of mobile work in EMS, combined with time pressures and competing clinical priorities, can make it difficult for both paramedics and hospital staff to consistently engage in feedback processes (Lally et al., 2020; McGuire et al., 2025; Schneider et al., 2026; Wilson et al., 2022). These barriers highlight the need for coordinated, sustained feedback mechanisms within EMS systems.

While paramedics in this study reported increased confidence from diagnostic feedback, subjective confidence does not always align with objective clinical competence. Simulation-based research in paramedicine has shown weak, and at times negative, associations between self-reported confidence and measured performance in technical and teamwork tasks, suggesting that perceived ability may not reliably reflect actual skill (Turan et al., 2026; Yang et al., 2022). These findings highlight the importance of incorporating objective performance measures when evaluating educational interventions.

CLINICAL IMPLICATIONS

Structured diagnostic feedback may support ongoing professional development across levels of paramedic experience. Innovative approaches, such as linking outcome feedback to microlearning and continuing education credit, may offer promising models for implementation (Kaduce et al., 2024). Low-resource approaches, including digital diagnosis summaries or QR-linked outcome reports, may serve as feasible starting points for EMS services seeking to introduce feedback at a system level (Klausen et al., 2023; Schneider et al., 2026). Policy-level coordination between hospitals and EMS organizations, along with clearer data-sharing frameworks, may help address long-standing barriers. These considerations align with broader efforts to modernize paramedic practice in Canada (Tavares et al., 2022).

RESEARCH IMPLICATIONS

Future studies could explore whether repeated feedback influences clinical practice over time. This could include using objective performance measures in addition to self-report.

Comparative studies evaluating different feedback formats, including timing, tone, mode of delivery, or integration with education platforms, could help identify optimal strategies for EMS systems. Engaging hospital leadership and frontline clinicians in future work may support more feasible and sustainable solutions to organizational barriers.

LIMITATIONS

This study has several limitations. First, data were collected from a single EMS region, which may limit the generalizability to settings with different organizational structures or existing feedback systems. Second, recruitment was conducted using a convenience sampling strategy, and the total number of eligible patient encounters was not recorded; because participation was encounter-based, opportunities to enroll may have varied between paramedics based on shift schedules and recruitment timing, which may limit the representativeness of the enrolled sample. Moreover, paramedics who declined to receive feedback were not studied; therefore, results largely reflect the views of individuals already inclined to engage with feedback systems and may underrepresent more skeptical views. Some paramedics informally reported declining feedback when they felt confident in their clinical impression (e.g., clear fractures or asthma exacerbations), though this was not formally assessed. Reasons for attrition between survey stages were not collected. The survey instrument was developed specifically for this study and had not undergone prior validation, which should be considered when interpreting the findings. Additionally, given the limited number of open-ended comments ($n = 22$), the qualitative component was limited in scope and findings are intended to provide contextual insight. Finally, the study relied on self-reported perceptions rather than objective performance data, which may introduce response bias.

CONCLUSION

In this study, paramedics reported that receiving ED diagnosis feedback supported their clinical development, encouraged reflective practice, and increased confidence in managing similar cases. Feedback was generally perceived as constructive, with only a minority reporting stress or anxiety related to diagnostic discrepancies. Timely delivery and supportive framing may enhance learning while minimizing unintended negative effects. Strengthening communication channels between hospitals and EMS agencies could further support sustainable feedback systems. Structured diagnostic feedback represents a practical approach to fostering professional growth and promoting collaboration between prehospital and hospital care teams.

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