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Paramedic Decision-Making in Out-of-Hospital Cardiac Arrest: Insights from a Discrete Choice Experiment in England and Wales

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Abstract

Decisions regarding resuscitation during out-of-hospital cardiac arrest (OHCA) are complex and influenced by multiple factors, including paramedics' individual judgment. These choices—whether to initiate, continue, withhold, or stop resuscitation—can vary widely. This study aimed to investigate how paramedics decide to commence resuscitation using a discrete choice experiment. From October to December 2022, paramedics from ten National Health Service ambulance trusts in England and Wales participated in a discrete choice experiment. Participants evaluated fourteen clinical scenarios, each with thirteen patient and situational attributes, and indicated whether they would offer resuscitation. A total of 864 paramedics completed the survey (median age 36 years, 61.8% male), with around half having less than five years of clinical experience. Overall, there was a general tendency to initiate resuscitation ($p < 0.01$). Most scenario attributes influenced decisions, except for patient gender. Resuscitation was less likely for patients aged 73 years or older, those with mild dementia, or moderate frailty. Paramedic characteristics such as female gender, very short (<5 years) or long (>10 years) professional experience, lower academic qualification, lower skill level, and fewer OHCA encounters were associated with a higher likelihood of offering resuscitation. Paramedic decisions during OHCA are shaped by a combination of patient characteristics and provider-related factors. Understanding these influences can inform strategies to support consistent, evidence-based resuscitation practices, reduce variability, and align actions with patient and public expectations.

Keywords: Paramedic, Decision-making, Out-of-hospital cardiac arrest, Resuscitation

Background

Out-of-hospital cardiac arrest (OHCA) is a life-threatening emergency. In the United Kingdom, National Health Service (NHS) ambulance services respond to around 30,000 OHCAs annually [1]. Despite these efforts, survival rates remain low, and many OHCAs arise from non-reversible causes [2]. With an increasingly aged population and higher prevalence of comorbidities, a significant proportion of patients experiencing OHCA are unlikely to respond favorably to resuscitation [3]. Current guidance suggests that cardiopulmonary resuscitation (CPR) should be considered a conditional intervention, and clinicians should define clear criteria for withholding resuscitation [4]. Paramedics attending OHCA must make critical decisions about whether to initiate, continue, terminate, or withhold resuscitation [5]. These decisions are complex, influenced by patient presentation, paramedic knowledge and experience, professional and personal beliefs, awareness of patient preferences [6], as well as perceived competence and clinical experience [7,8]. Many of these influences are not explicitly addressed in existing resuscitation guidelines [4].

Consequently, paramedic decision-making is variable, which can sometimes result in resuscitation that may not be clinically appropriate [6,9,10]. While decisions are frequently guided by clinical judgment, they are also shaped by individual provider preferences, family input, and assessments of futility [11].

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Understanding the factors that most strongly affect paramedic decision-making is increasingly recognized as essential to improve consistency, ensure evidence-based practice, and optimize patient outcomes. This study uses a discrete choice experiment (DCE) to investigate paramedic decision-making in OHCA, taking into account patient, provider, and situational characteristics.

Methods

Discrete choice experiments

Discrete choice experiments (DCEs) are a survey-based method used to elicit individuals' stated preferences by presenting them with hypothetical scenarios and examining the factors that influence their decisions. The method assumes that choices are shaped by multiple characteristics, and that individuals weigh trade-offs among these characteristics when making decisions. DCEs provide a unique window into decision-making by capturing subtle, often implicit preferences that are difficult to access through traditional research approaches [12]. While DCEs have been employed to investigate clinician preferences in intensive care [13] and trauma settings [14], as well as CPR preferences among seriously ill patients [15], they have not previously been applied to understand how paramedics decide whether to initiate resuscitation during OHCA.

This study implemented a DCE to determine the relative importance of factors guiding paramedic decision-making in OHCA scenarios, following the guidelines recommended by the Conjoint Analysis Task Force [16].

Development of the DCE: Attributes and levels

The process began with a systematic review to identify variables known to influence paramedic resuscitation decisions. Insights from this review informed a qualitative interview guide, which was used to conduct in-depth interviews with paramedics regarding their experiences and perceptions of decision-making in OHCA situations. Analysis of the interview data using a phenomenological approach identified 72 potential attributes spanning patient characteristics, clinical context, and scene-specific factors.

To refine this extensive list, seven paramedics—selected opportunistically, including some with roles in resuscitation policy or audits—ranked the attributes using a 5-point Likert scale, where 1 indicated highest importance and 5 the lowest. Participants could indicate equal importance for attributes and propose additional ones if relevant. This iterative process resulted in a final set of 13 attributes with 48 levels, which formed the basis for the DCE **(Table 1)**.

Table 1. Final list of attributes and levels

Attribute	Levels / Categories
Patient age (years)	26, 31, 47, 56, 65, 73, 89, 97
Patient gender	Male Female
Initial cardiac arrest rhythm	Asystole Pulseless Electrical Activity (PEA) Ventricular Fibrillation (VF)
No-flow interval (time from collapse to start of CPR)	<15 minutes
Presence of reversible causes	Possible reversible cause(s) identified No known reversible cause
Known valid DNACPR or Advance Directive	Yes – valid DNACPR or Advance Directive stating "no CPR" No – no valid DNACPR or Advance Directive prohibiting CPR
Location of out-of-hospital cardiac arrest (OHCA)	Private residence/dwelling Public location
Initial witnesses to the collapse	Family or friends Members of the public No witness
Bystander CPR performed	Yes No
Patient's baseline quality of life / functional status	Independent Independent with occasional help Requires regular assistance with most activities Dependent on assistance for all daily living activities
Dementia / cognitive status	No cognitive impairment or dementia Age-related memory impairment Mild cognitive impairment Mild dementia Moderate dementia Moderately severe dementia Severe dementia
Frailty (Clinical Frailty Scale)	Not frail (CFS 1–3) Vulnerable (CFS 4) Mildly frail (CFS 5) Moderately frail (CFS 6) Severely frail (CFS 7) Very severely frail or terminally ill (CFS 8–9)
Family wishes regarding resuscitation	Family states patient would not want resuscitation Family wishes unknown Family defers to paramedic decision Family insists on resuscitation

Experimental design and construction of choice tasks

To develop an efficient experimental framework, the DCE was constructed using Lighthouse Studio software (v9.15.0, https://www.sawtoothsoftware.com) [17]. The software generated 14 choice sets, including 12 randomized scenarios and two fixed scenarios designed to represent extreme cases—one likely to result in offering resuscitation and one likely to result in withholding it. Logical constraints were applied to prevent unrealistic combinations of attributes (e.g., pairing a very young patient with frailty). The primary outcome of interest was a

binary decision—whether to offer resuscitation or not—mirroring real-world clinical practice, where paramedics make decisions for individual patients.

To ensure the plausibility and clarity of the scenarios, a small group of paramedics (n = 4) reviewed the vignettes for face validity and consistency of attribute interpretation. Attribute definitions were provided to standardize understanding across respondents. A pilot study using a 'think-aloud' method [18] was conducted with this same group, allowing participants to verbalize their thought processes and identify ambiguous or confusing elements. A further internal pilot with a larger group of paramedics (n = 7) was undertaken to finalize vignette wording, structure, and overall survey design.

Preference elicitation and data collection

Data were collected between October and December 2022. All NHS ambulance trusts in England and Wales were invited to participate. Eligible participants were registered paramedics who had attended OHCA events in the preceding 12 months and were responsible for providing resuscitation. Recruitment communications were distributed through individual trusts. Participants accessed the study via an electronic link, which included a participant information sheet, followed by the online survey. After providing demographic information, respondents completed the DCE. A sample vignette is presented in **Figure 1**.

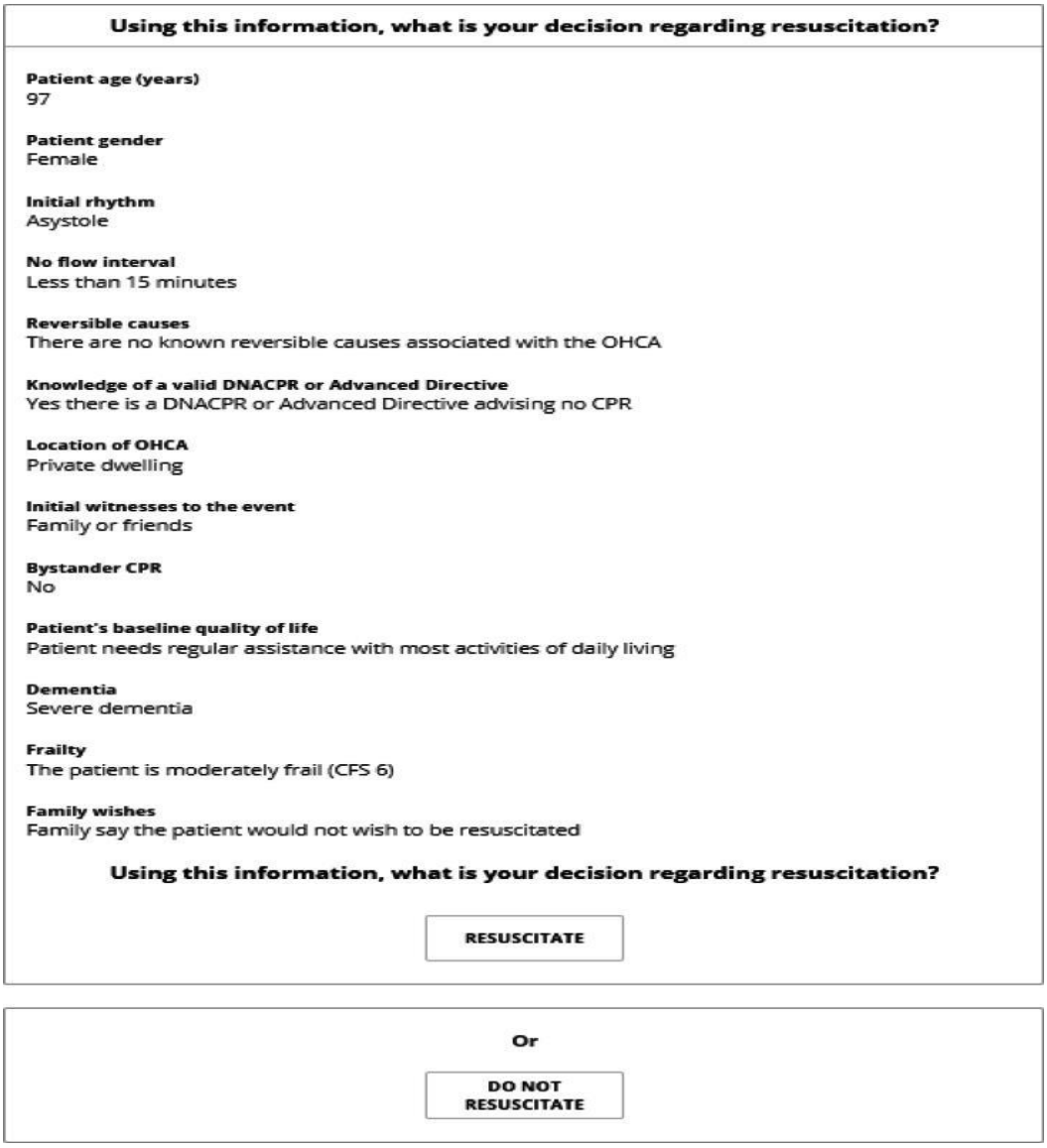

Figure 1. Sample vignette

Data analysis

The demographic and professional characteristics of participants were first summarized using descriptive statistics. Responses to the DCE vignettes were then evaluated using hierarchical logistic regression models for

binary outcomes. The analysis modelled the decision to initiate resuscitation as a function of patient-specific attributes in the vignettes and paramedic-level characteristics, enabling an assessment of which patient factors promote or discourage resuscitation, as well as how provider traits contribute to variation in decisions (observed heterogeneity). Interactions between paramedic characteristics—such as age, years of experience, and highest academic qualification—and patient attributes were incorporated to examine whether the influence of patient factors differed according to clinician profiles.

The analysis aimed to determine: (i) overall trends in resuscitation preference, (ii) the relative importance of each attribute and level, and (iii) the impact of paramedic characteristics on the resuscitation decision. Importance scores were scaled from 1 to 100, indicating the relative weight of each factor in decision-making. The model included an alternative-specific constant (ASC) representing baseline inclination to provide treatment versus no treatment, with all parameters assumed to follow a normal distribution. Positive importance scores signified factors favoring resuscitation, whereas negative scores indicated factors associated with withholding treatment. A p-value < 0.05 was considered statistically significant, and incomplete survey responses were excluded from the analysis.

Ethics

The study received ethical approval from the Northumbria University Research Ethics Committee [49282] and the Health Research Authority [IRAS 317321]. Participants provided electronic informed consent before commencing the survey.

Results

The study included 864 paramedics, 61.8% of whom were male, with a median age of 36 years (IQR 17.1). Approximately half had less than five years of clinical experience (51.2%). Most respondents reported attending adult resuscitation events more than twice in the preceding year, and 84.3% had done so in the last three months. Participants were drawn from ten of eleven NHS ambulance trusts across England and Wales. A small number of participants did not provide demographic information **(Table 2)**. The average time to complete the DCE was 30 minutes and 18 seconds.

Table 2. Respondent characteristics

Characteristic	n (%)
Age	
21–30 years	281 (32.5)
31–40 years	271 (31.4)
41–50 years	200 (23.1)
≥51 years	110 (12.7)
Prefer not to say	2 (0.2)
Median age (IQR)	36 years (17.1)
Gender	
Male	534 (61.8)
Female	319 (36.9)
Prefer not to say	11 (1.3)
Years qualified as a paramedic	
≤2 years	175 (20.3)
2–5 years	268 (31.0)
6–10 years	168 (19.4)
>10 years	242 (28.0)
Prefer not to say	11 (1.3)
Current clinical skill level / role	
Newly qualified paramedic	176 (20.4)
Paramedic	377 (43.6)
Rapid Response Vehicle paramedic	54 (6.3)
Specialist / Critical Care paramedic	101 (11.7)
Other	144 (16.7)
Prefer not to say	12 (1.4)
Religious belief	
Yes	114 (13.2)
No	713 (82.5)
Prefer not to say	37 (4.3)
Highest educational qualification	
GCSE/CSE/O Level or equivalent	25 (2.9)
AS/A Level or equivalent	27 (3.1)

Undergraduate degree	608 (70.4)
Postgraduate qualification	139 (16.1)
Other	57 (6.6)
Prefer not to say	8 (0.9)
Adult resuscitation attempts in past 12 months	
1–2 times	80 (9.3)
3–5 times	277 (32.1)
6–10 times	258 (29.9)
>10 times	238 (27.5)
Unsure	8 (0.9)
Prefer not to say	3 (0.3)
Time since last adult resuscitation	
Within last 3 months	728 (84.3)
4–6 months ago	94 (10.9)
7–12 months ago	36 (4.2)
Prefer not to say	6 (0.7)

Discrete choice experiment findings

A total of 10,368 individual resuscitation decisions were recorded across all DCE scenarios. Overall, participants demonstrated a clear inclination to initiate resuscitation: 58% of responses (n = 6,015) favoured resuscitation, while 42% (n = 4,353) opted against it. No paramedics consistently chose to withhold resuscitation across all vignettes, and responses to the two predetermined "fixed" scenarios aligned with expectations, confirming comprehension of the task.

Influence of attributes on decision-making

Analysis of the DCE revealed that almost all patient and scenario attributes contributed to decision-making, though the degree of influence varied considerably. The presence of a valid DNACPR or advanced directive emerged as the strongest determinant (R^2 = 19.22; 95% CI 19.05–19.38; $p < 0.01$), followed by expressed family wishes (R^2 = 10.67; 95% CI 10.54–10.80; $p < 0.01$) and patient age (R^2 = 10.3; 95% CI 10.20–10.39; $p < 0.01$). Attributes such as reversible causes of arrest exerted a more modest effect (R^2 = 2.45; 95% CI 2.35–2.55; $p < 0.05$). In contrast, patient gender had little impact on the decision to offer resuscitation.

The alternative-specific constant (ASC) was negative and statistically significant (R^2 = −8.09; 95% CI −11.61 to −4.56; $p < 0.01$), reflecting an overall tendency among participants to prefer providing resuscitation when other factors were held constant. These findings suggest that while clinical and patient characteristics guide paramedic decisions, legal and social considerations, such as directives and family input, carry the greatest weight in influencing resuscitation choices **(Table 3)**.

Table 3. HB analysis for the decision to offer or withhold resuscitation

Attribute	R^2	95% CI	p-value
Patient age (years)	10.30	10.20 – 10.39	<0.01
Patient gender	1.28	1.21 – 1.34	>0.05
Initial cardiac arrest rhythm	9.16	9.01 – 9.31	<0.01
No-flow interval	9.44	9.26 – 9.61	<0.01
Presence of reversible causes	2.45	2.35 – 2.55	<0.05
Known valid DNACPR or Advance Directive	19.22	19.05 – 19.38	<0.01
Location of out-of-hospital cardiac arrest	5.62	5.50 – 5.74	<0.01
Initial witnesses to the collapse	2.79	2.71 – 2.87	<0.01
Bystander CPR performed	7.69	7.55 – 7.84	<0.01
Patient's baseline quality of life/functional status	7.34	7.24 – 7.44	<0.01
Dementia/cognitive impairment	4.85	4.71 – 4.99	<0.01
Frailty (Clinical Frailty Scale)	9.19	9.04 – 9.34	<0.01
Family wishes regarding resuscitation	10.67	10.54 – 10.80	<0.01
ASC (Ambulance Service Constant – model intercept)	−8.09	−11.61 to −4.56	<0.01

significant at $p < 0.05$.

DNACPR, do not attempt cardiopulmonary resuscitation; OHCA, out of hospital cardiac arrest; CPR, cardiopulmonary resuscitation; ASC, alternative specific constant.

Impact of individual attribute levels on resuscitation decisions

Paramedics' likelihood of initiating resuscitation was influenced by specific patient and situational characteristics. Factors that increased the probability of resuscitation included younger patient age, presentation with pulseless electrical activity (PEA) or a shockable rhythm, a no-flow interval shorter than 15 minutes, and the presence of reversible causes. Decisions were also positively associated with scenarios in which the patient had no DNACPR

or advanced directive, the arrest occurred in a public location, bystanders were present, bystander CPR was performed, the patient previously enjoyed high functional independence, and family members indicated that resuscitation would be desired.

The analysis further identified threshold points within certain attributes where paramedic preferences shifted. Resuscitation was less likely for patients aged 73 years or older ($R^2 = -1.79$; 95% CI −89.17 to −0.73; $p > 0.05$), those with mild cognitive impairment ($R^2 = 1.10$; 95% CI −2.11 to −0.10; $p > 0.05$), and patients with moderate frailty ($R^2 = -3.35$; 95% CI −4.35 to −2.34; $p < 0.01$). These "cut-off" points highlight where clinicians' propensity to provide resuscitation declines. A detailed breakdown of all attribute levels and their statistical significance is provided in **Table 4**.

Table 4. Utility scores by attribute and level regarding the decision to offer or withhold resuscitation

Attribute and level	R^2	SD	95% CI	P value
Patient age (years)				
26	10.14	25.17	8.46–11.82	<0.01
31	18.01	19.75	16.69–19.33	<0.01
47	27.83	10.35	27.13–28.52	<0.01
56	10.61	12.86	9.75–11.46	<0.01
65	38.07	14.81	37.08–39.05	<0.01
73	−1.79	15.94	−89.17 to −0.73	>0.05
89	−14.69	10.29	−15.38 to −14.01	<0.01
97	−88.16	15.21	−89.17 to −87.15	<0.01
Patient gender				
Male	0.45	10.64	−0.26–1.16	>0.05
(Female)	(-0.45)	(10.64)	(-1.16–0.26)	(>0.05)
Initial rhythm				
Asystole	−69.07	15.40	−70.10 to −68.05	<0.01
Pulseless electrical activity (PEA)	22.14	13.73	21.22–23.05	<0.01
Ventricular fibrillation (VF)	46.93	18.81	45.68–48.19	<0.01
No flow interval				
Less than 15 minutes	61.31	17.51	60.14–62.47	<0.01
(More than 15 minutes)	(-61.31)	(17.51)	(-62.47 to −60.14)	(<0.01)
Reversible causes				
Possible reversible causes	15.52	10.46	14.82–16.21	<0.01
(No known reversible causes)	(-15.52)	(10.46)	(-16.21 to −14.82)	(<0.01)
Knowledge of a valid DNACPR or Advanced Directive				
Yes there is a DNACPR or Advanced Directive advising no CPR	−159.28	20.99	−160.68 to −157.88	<0.01
No there is no known DNACPR or Advanced Directive advising no CPR	86.85	16.29	85.76–87.93	<0.01
Unknown	72.43	14.40	71.47–73.39	<0.01
Location of OHCA				
Private dwelling	−36.51	11.83	−37.30 to −35.72	<0.01
(Public location)	(36.51)	11.83	(35.72—37.30)	(<0.01)
Initial witnesses to the event				
Family or friends	−12.68	11.31	−13.44 to −11.93	<0.01
Members of the public	13.26	10.08	12.59–13.93	<0.01
None	−0.58	16.80	−1.70 to 0.54	>0.05
Bystander CPR				
Yes	49.99	14.09	49.05–50.93	<0.01
(No)	(-49.99)	14.09	(-50.93 to −49.05)	<0.01
Patient's baseline quality of life				
Independent	51.04	11.78	50.25–51.83	<0.01
Independent with occasional assistance	15.59	19.19	14.31–16.87	<0.01
Regular assistance with most activities	−36.12	20.27	−37.47 to −34.77	<0.01
Assistance with all aspects of daily living	−30.51	11.23	−31.26 to −29.76	<0.01
Dementia				
No cognitive decline or dementia	11.67	22.40	10.17–13.16	<0.01
Age associated memory loss	9.04	11.99	8.24–9.84	<0.01
Mild cognitive impairment	3.59	15.91	2.53–4.65	<0.01
Mild dementia	−1.10	15.08	−2.11 to −0.10	>0.05
Moderate dementia	17.31	14.69	16.33–18.29	<0.01
Moderately severe dementia	−14.77	16.35	−15.86 to −13.68	<0.01

Severe dementia	−25.73	22.47	−27.22 to −24.23	<0.01
Frailty				
Not frail (CFS 1–3)	42.73	14.04	41.79–43.66	<0.01
Vulnerable to frailty (CFS 4)	21.43	12.41	20.60–22.26	<0.01
Mildly frail (CFS 5)	19.81	13.38	18.92–20.70	<0.01
Moderately frail (CFS 6)	−3.35	15.03	−4.35 to −2.34	<0.01
Severely frail (CFS 7)	−6.37	17.42	−7.53 to −5.21	<0.01
Very severely frail or terminally ill (CFS 8 or 9)	−74.25	21.93	−75.71 to −72.79	<0.01
Family wishes				
Family say the patient would not wish to be resuscitated	−78.84	17.82	−80.03 to −77.65	<0.01
Family wishes are unknown	13.44	14.62	12.47–14.42	<0.01
Family will leave all decisions to the paramedic	6.11	11.91	5.31–6.90	<0.01
Family insist on the patient being resuscitated	59.29	13.52	58.39–60.19	<0.01
ASC	−8.09	52.89	−11.61 to −4.56	<0.01

significant at p=<0.05.
SD, Standard Deviation; CI, Confidence Interval; DNACPR, do not attempt cardiopulmonary resuscitation; OHCA, out of hospital cardiac arrest;
CPR, cardiopulmonary resuscitation; CFS, clinical frailty scale; ASC, alternative specific constant.

Influence of paramedic characteristics (Covariates) on resuscitation decisions

Analysis of paramedic-level covariates revealed few statistically significant differences in how individual characteristics influenced responses across attribute levels. Regarding the alternative-specific constant (ASC), a general tendency to offer resuscitation was observed across all respondents. Notably, female paramedics and those who preferred not to disclose gender were approximately five times more likely to initiate resuscitation compared with male paramedics (R^2 = −15.53 and −14.73 versus −3.5; all $p < 0.01$).

Years of professional experience also influenced decisions: those with either the shortest (<5 years) or longest (>10 years) duration since qualification, as well as participants with lower academic attainment (undergraduate level), were more inclined to offer resuscitation than colleagues with 6–10 years of experience or postgraduate qualifications. In contrast, paramedics working in specialist or critical care roles demonstrated a greater propensity to withhold resuscitation relative to other roles. Additionally, the likelihood of offering resuscitation decreased with an increasing number of OHCAs attended in the preceding 12 months (all $p < 0.05$). A full summary of covariate effects is presented in **Table 5**.

Table 5. Covariates interacted with HB model

Covariate	n	R^2 contribution	95% CI	p-value
Respondent gender				
Male	534	−3.50	−8.05 to −1.05	<0.01
Female	319	−15.53	−21.10 to −9.95	<0.01
Prefer not to say	11	−14.73	−45.56 to −16.10	<0.01
Years qualified as a paramedic				
≤2 years	175	−20.14	−26.73 to −13.54	<0.01
2–5 years	268	−7.62	−13.91 to −1.32	<0.01
6–10 years	168	5.55	−1.34 to 12.44	<0.01
>10 years	242	−9.43	−16.36 to −2.49	<0.01
Prefer not to say	11	−6.29	−29.80 to 17.22	<0.01
Highest academic qualification				
GCSE/CSE/O Level or equivalent	25	−11.77	−7.38 to 30.98	>0.05
AS/A Level or equivalent	27	−25.68	−40.82 to −10.53	<0.01
Undergraduate degree	609	−9.63	−14.22 to −5.04	<0.01
Postgraduate qualification	139	3.52	−5.34 to 12.38	<0.01
Other	57	−11.44	−25.96 to 3.08	<0.01
Prefer not to say	8	2.62	−21.76 to 27.05	<0.01
Number of OHCA resuscitations in past 12 months				
1–2 times	80	−10.98	−23.49 to 1.53	<0.01
3–5 times	277	−15.94	−21.88 to −9.99	<0.01
6–10 times	258	−10.01	−16.35 to −3.66	<0.01
>10 times	238	4.25	−2.81 to 11.31	<0.01
Unsure	8	−20.78	−54.90 to 13.34	<0.01
Prefer not to say	3	15.67	12.79 to 18.63	<0.01
Current clinical skill level / role				
Newly Qualified Paramedic (NQP)	176	−20.36	−26.28 to −14.43	<0.01
Paramedic	377	−10.80	−16.11 to −5.48	<0.01

Rapid Response Vehicle (RRV) paramedic	54	−6.80	−20.78 to −7.18	<0.01
Specialist / Critical Care paramedic	101	15.85	5.73 to 25.96	<0.01
Other	144	−2.09	−10.86 to 6.68	<0.05
Prefer not to say	12	−21.90	−45.38 to −1.58	<0.01

OHCA, out of hospital cardiac arrest; GCSE, general certificate of secondary education; A-Level, advanced level; NQP, newly qualified paramedic; RRV, rapid response vehicle.

Discussion

To our knowledge, this study represents the first discrete choice experiment (DCE) investigating both patient- and paramedic-level factors that influence decisions to offer resuscitation for out-of-hospital cardiac arrest (OHCA) in England and Wales. Overall, participants demonstrated a strong tendency to initiate resuscitation. This aligns with current guidelines, which advise that resuscitation should not be withheld except in cases of irreversible death or when a valid advance directive exists [4]. Notably, even when paramedics recognize that resuscitation may be futile, treatment is often still commenced or continued [19, 20].

Younger patient age emerged as a key determinant in the decision to offer resuscitation, consistent with prior research indicating that younger patients not only receive resuscitation more frequently [21] but also experience longer and more aggressive interventions [7,22]. The reluctance to initiate resuscitation in older patients may reflect paramedics' perceptions that advanced age correlates with poorer outcomes [10,23], or assumptions regarding patients' wishes. While younger patients generally have better survival rates and more favourable neurological outcomes following OHCA [24, 25], it is important to note that survival is influenced more by arrest-specific factors than by age or comorbidity alone [26, 27]. In this study, the age threshold for withholding resuscitation was identified as approximately 73 years, similar to findings from previous research [10]. However, subsets of older patients—including those aged 90 years and above—can still achieve survival rates over 10% with comparable neurological outcomes [28], suggesting that age-based cut-offs warrant cautious interpretation and further evaluation.

Paramedics in this study were more likely to offer resuscitation when objective indicators of success were present, such as a shockable initial rhythm, witnessed arrest, and bystander CPR [3,29]. Beyond these guidelines-based factors, clinicians also appeared to consider patient quality of life and cognitive status. Resuscitation was significantly less likely in patients with dementia or reduced functional independence, reflecting paramedics' perception that such individuals have a lower likelihood of meaningful recovery [24,30]. Although these judgments are often subjective and difficult to ascertain in the field, they suggest paramedics are attempting to integrate anticipated outcomes and quality-of-life considerations into their decision-making. Evidence on the prognostic value of pre-arrest quality of life is mixed: some studies report an association with lower survival and recovery [31], while others argue that arrest-related factors, rather than comorbidity, primarily determine outcomes [27]. The non-significant statistical results for age and mild cognitive impairment in our study may indicate that paramedics are sometimes inclined to offer the "benefit of the doubt," favouring intervention when potential benefits outweigh perceived risks.

Frailty (CFS 1–5) also emerged as a factor influencing resuscitation decisions, with a ceiling effect observed for milder levels. This aligns with previous findings that paramedics often judge the likelihood of success based on initial physical impressions of the patient [5,20], and that frailty is associated with poor post-resuscitation outcomes [32,33]. Although there are currently no formal guidelines addressing frailty in OHCA [34], respondents appear to consider it as a complementary prognostic indicator. However, frailty is challenging to assess accurately during an arrest [35] and is not routinely incorporated into paramedic decision-making [36].

The context of the arrest also influenced decisions. Resuscitation was more likely when the OHCA occurred in a public location or when bystanders were present. This may reflect the difficulty of discussing treatment limitation in public settings and the social pressures associated with performing or withholding resuscitation in front of observers [37,38]. Public expectations of resuscitation outcomes are often optimistic, potentially prompting paramedics to intervene to avoid negative perceptions or criticism.

Influence of paramedic characteristics on decision-making

In this study, paramedics who were male, more experienced, possessed higher academic qualifications, had attended a greater number of OHCA events, or demonstrated higher skill levels were more likely to withhold resuscitation. This pattern likely reflects the impact of professional experience and exposure: clinicians who have witnessed multiple unsuccessful resuscitation attempts may develop refined judgment regarding the likelihood of treatment success. Dyson *et al.* similarly observed that increased exposure to OHCA was associated with fewer attempted resuscitations but improved survival outcomes [39], underscoring the role of informed decision-making in optimizing patient outcomes. Beyond clinical and evidence-based considerations, paramedics also draw on heuristic and tacit knowledge to guide their decisions [40]. The finding that female paramedics were more likely

to offer resuscitation remains unexplained, although similar trends have been reported previously [41]. These results suggest that less experienced or lower-skilled paramedics may benefit from targeted training and support to strengthen decision-making during OHCA.

Clinical implications

The findings highlight persistent ethical dilemmas in resuscitation decisions, particularly when choices are influenced by patient age, pre-existing frailty, dementia, or quality of life. Participants indicated that these subjective factors are actively considered when evaluating the appropriateness and potential success of resuscitation. How such decisions align with patient or public expectations, however, remains unclear, raising questions about transparency and consistency in clinical practice.

Strengths and limitations

This study employed innovative methods to examine paramedic preferences, priorities, and thresholds for offering resuscitation in OHCA. The vignettes were carefully developed to maximize plausibility, validity, and relevance, and the study achieved a robust response rate, capturing perspectives from nearly all NHS ambulance trusts in England and Wales. This provides a broad insight into paramedic decision-making in real-world contexts.

However, limitations must be acknowledged. The vignettes, while comprehensive, represent idealized scenarios and omit contextual factors such as environmental conditions, physical and emotional stress, and cognitive load experienced during actual OHCA events. These omissions may limit the ecological validity of the findings. Additionally, many DCE designs rely on expert opinion rather than published data for attribute selection, potentially introducing bias. It is plausible that decisions made in real-life emergencies may differ from those reported in the study. Finally, no data were collected on non-respondents, leaving the potential for participation bias unexamined.

Conclusion

Paramedics integrate both objective clinical indicators and subjective considerations when deciding whether to initiate resuscitation during OHCA. Subjective factors and their thresholds are often open to interpretation, contributing to variability in decision-making. Future research should explore strategies to support paramedics in making consistent, evidence-aligned decisions, investigate the impact of decision variability on patient outcomes, and examine how these choices correspond with patient and public expectations.

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