Title

The experiences of EMS providers taking part in a large randomised trial of airway management during out of hospital cardiac arrest, and the impact on their views and practice. Results of a survey and telephone interviews

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ABSTRACT

Aims

To explore EMS experiences of participating in a large trial of airway management during out-of-hospital cardiac arrest (AIRWAYS-2), specifically to explore:

1. Any changes in views and practice as a result of trial participation.
2. Experiences of trial training.
3. Experiences of enrolling critically unwell patients without consent.
4. Barriers and facilitators for out-of-hospital trial participation.

Methods

An online questionnaire was distributed to 1523 EMS providers who participated in the trial. In-depth telephone interviews explored the responses to the online questionnaire.

Quantitative data were collated and presented using simple descriptive statistics. Qualitative data collected during the online survey were analysed using content analysis. Interpretive Phenomenological Analysis was used for qualitative interview data.

Results

Responses to the online questionnaire were received from 33% of the EMS providers who participated in AIRWAYS-2, and 19 providers were interviewed. EMS providers described barriers and facilitators to trial participation and changes in their views and practice.

The results are presented in five distinct themes: research process; changes in airway management views and practice; engagement with research; professional identity; professional competence.

Conclusions

Participation in the AIRWAYS-2 trial was enjoyable and EMS providers valued the study training and support. There was enhanced confidence in airway management as a result of taking part in the trial. EMS providers indicated existing variability in training, experience and confidence in tracheal intubation, and expressed a preference for the method of airway management to which they had been randomised. There was support for the stepwise approach to airway management, but also concern regarding the potential loss of tracheal intubation from 'standard' EMS practice. The views and practices of the EMS providers expressed in this research will usefully inform the design of future similar trials.

INTRODUCTION

AIRWAYS-2 was a multi-centre cluster randomised controlled trial of the clinical and cost effectiveness of the i-gel supraglottic airway device versus tracheal intubation in the initial airway management of out-of hospital-cardiac arrest (OHCA). It was a pragmatic trial comparing the i-gel supraglottic airway device with tracheal intubation as the initial advanced airway strategy delivered by EMS providers (paramedics) during OHCA.[1,2] Prehospital guidelines and practice will not only be shaped by results of large trials such as AIRWAYS-2, but also by the views and practice of EMS providers towards OHCA, airway management and research.

The participation of 1,523 volunteer study paramedics in AIRWAYS-2, across four EMS provider organisations (ambulance services) in England, provided a unique opportunity for an in-depth exploration of how the views and practice of study paramedics have developed as a result of their involvement in the trial, and how their experiences might inform future trials.

Previous studies have identified significant facilitators and barriers to research in emergency care[3] and to the involvement of EMS providers in research.[4,5] With a growing number of out-of-hospital (OOH) trials now taking place, it is important to establish if these factors have changed, in order to ensure study designs are acceptable to staff and therefore likely to succeed. In addition, little is known about how participation in research influences the clinical practice of paramedics.

An online questionnaire was designed to: explore whether study paramedics' views and practice had changed as a result of participating in the AIRWAYS-2 trial; assess experiences of trial training and enrolling critically unwell patients without consent and explore the current barriers and facilitators for OOH trial participation. Following the online survey, individual interviews were completed to elicit a deeper understanding of the responses to the survey and the practical experience of EMS providers taking part in the study as well as their beliefs about OOH airway management and research.

METHODS

An online questionnaire was designed and distributed by email to all 1,523 AIRWAYS-2 study paramedics across the four participating ambulance services. Study paramedics completed the online survey between May 2018 and August 2018. The survey (Appendix 1) contained 18 questions with a mixture of yes/no answers, Likert rating questions [6] and free text responses. Participant demographic data were also collected.

All study paramedics from one of the four participating ambulance services (n= 511) were invited to take part in a semi-structured interview (Appendix 2). Telephone Interviews were conducted by JBr and KK.

Quantitative data were collated and presented using simple descriptive statistics. Qualitative data collected during the online survey were analysed using content analysis. Verbatim responses to open ended questions were coded into categories for analysis.[7] An Interpretive Phenomenological Analysis (IPA) approach was used for the analysis of qualitative interview data. IPA focuses on the subjective experience of participants; it allows exploration of personal experience and its meaning whilst also allowing for the researchers' interpretation.[8]

The interviews were analysed thematically using the following phases:

1. Transcribing audio recorded interviews into verbatim text.
2. Familiarisation with the transcripts by reading and re-reading.
3. Identifying codes and new codes, not previously occurring in survey responses, using the respondent's language.
4. Coding, illustrating and clarifying the meaning and context of survey data
5. Grouping codes according to theme, where relationships exist between the concepts.
6. Refining themes.
7. Defining and naming themes. [9]

RESULTS

498 (33%) of the AIRWAYS-2 study paramedics completed the online survey; 24%, 13%, 38%, 25% from each of the four participating ambulance services. Of the survey respondents, 253 were allocated to the i-gel arm of the trial and 245 to the tracheal intubation arm of the trial.

Nineteen paramedics volunteered and participated in an individual semi-structured telephone interview (Appendix 2). Of the 19 AIRWAYS-2 individuals who completed telephone interviews, 6 were allocated to the i-gel arm of the trial and 13 were allocated to tracheal intubation. The interview participants had a range of 3 – 18 years of paramedic service and had each enrolled between 1 and 13 patients into the AIRWAYS-2 trial.

The results are described in five distinct themes: research process; changes in views and practice; engagement with research; professional identity; professional competence.

Research Process

Experiences of trial training and study support

The experiences of the AIRWAYS-2 study paramedics were largely positive, with 85% of survey respondents reporting their experiences as positive or very positive.

Figure 1: Participants' experience of participating in AIRWAYS-2

Survey respondents indicated that study training and study support acted as a facilitator to their participation in AIRWAYS-2. The interview participants reflected upon the research process; the study support and the arrangements to manage data collection. They were broadly content with the study support and the assistance they had received from a dedicated full-time research paramedic employed in each of the four participating ambulance services. They appreciated the research paramedics' understanding of the context in which the data were collected, because they were also EMS clinicians. Prompts provided by the research paramedics were felt to be useful and a source of good advice: Table 1, quote 1.

Study support was only available during normal working hours and some paramedics, who were working shifts, would have liked access to advice out of hours. Without it they could feel isolated: Table 1, quote 2.

The survey indicated that 94% of respondents rated the study training as either good or excellent. Respondents valued the efforts of the study team to deliver training locally: Table 1, quote 3.

This was corroborated during the telephone interviews where participants voiced their approval of the study training, which helped them feel confident about their airway management skills. This was particularly the case for participants lacking confidence in tracheal intubation: Table 1, quote 4.

Barriers to prehospital trial participation

Figure 2 indicates that the majority of the survey respondents found the study protocol easy to adhere to.

Figure 2: Ease of adhering to the AIRWAYS-2 study protocol

Survey respondents indicated that completing the study paperwork could be challenging, and this was reiterated by the interviewees: Table 1, quote 5.

An identified difficulty was being the second or subsequent paramedic on scene at an OHCA which could make the decision-making more challenging. This was also referred to in the interviews: Table 1, quote 6.

Neither survey respondents nor interview participants expressed any unease about enrolling critically unwell patients without consent into the trial, and accepted the process without difficulty or challenge.

Changes in views and practice

The survey asked study paramedics about their preferred method of airway management before and after taking part in AIRWAYS-2. Figures 3 and 4 show the changes in study paramedics' preferred airway before and after participation in AIRWAYS-2 in the i-gel arm and tracheal intubation arm respectively.

Figure 3: Study paramedics preferred method of airway management in the i-gel arm before and after participation in AIRWAYS-2

The preferred airway in the i-gel arm clearly moved from tracheal intubation (41% before – 21% after), to i-gel (45% before – 71% after).

Figure 4: Study paramedics preferred method of airway management in the tracheal intubation arm before and after participation in AIRWAYS-2

Participants in the tracheal intubation arm reported a more marked preference for intubation than participants in the i-gel arm prior to the trial (54% v 41%), and paramedics in the tracheal intubation arm marginally increased their preference for intubation after taking part in the trial from 54% to 57%, with a corresponding reduction in their preference for the i-gel (from 37% to 35%)..

In both arms of the trial 33% of study paramedics indicated that their views had changed regarding airway management as a result of participating in the research, whilst 67% indicated that their views had not changed as a result of participating in AIRWAYS-2. The majority of the comments where views had changed related to both a preference for i-gel and a preference for using a stepwise approach to airway management: Table2, quote 1 and 2.

Engagement with research

Paramedics discussed their engagement with OOH research, and a perception that there is a lack of high-quality research informing their practice. They therefore welcomed the AIRWAYS-2 study. They suggested that OOH research is often conducted outside the UK and by disciplines other than para-medicine, limiting its applicability. They also noted the importance of developing OOH research in order to shape their own profession: Table 3, quote 1.

Professional identity

Participants discussed airway management and particularly tracheal intubation during the survey and interviews. Comments indicated the significance of this skill for some members of the paramedic profession. Some of the comments were contradictory and there remained a clear unease amongst some paramedics regarding the possibility of removing tracheal intubation from standard practice: Table 4, quotes 1 and 2.

A proportion of respondents in the online survey indicated that although they were happy to use an i-gel initially, they would not like to see intubation removed from practice: Table 4, quotes 3 and 4.

Some participants acknowledged that newer paramedics may not feel so strongly about the skill of tracheal intubation, and that some modern paramedic training courses do not include tracheal intubation in the curriculum. Those who have been qualified for a long time and are trained and well-practiced in airway management may feel better able to identify which airway is best suited to both the patient and the environment: Table 4, quote 5.

There was some participant perception that the profession they are part of is both 'youthful' and evolving and developing. This means that paramedics are becoming more cognizant of the need for evidence-based practice and thus high-quality research studies, led by para-medicine rather than other professions: Table 4, quote 6.

Procedural competence

"…it's not seen as a failure if you don't get a tube. It's a failure if you don't maintain an airway." (interview participant 19)

Participants felt that taking part in the study increased competence and confidence in either performing intubation or choosing the correct i-gel size: Table 5, quote 1.

However, there was some recognition that an i-gel is not always the best choice, or even successful: Table 5, quote 2.

The respondents spoke of the stepwise approach to airway management, but indicated different views on this. One participant suggested using a step-wise approach removes the need to decide which technique to use first.

Some participants indicated that they always use a step-wise approach, while others described using their professional judgement and clinical skills to omit steps according to the clinical situation. This was described as being flexible and responsive. They also witnessed this in their colleagues. Respondents became acutely aware of the stepwise approach to airway management as a result of

the study training. This is likely to have an effect for some time after trial competition: Table 5, quote 3.

Although there was a recognition that AIRWAYS-2 found no difference in the overall frequency of regurgitation and aspiration between the two arms of the trial, respondents reported airway security was the main reason for opting for intubation early on. Difficult patient 'extraction' and long travel times were both given as reasons for missing steps and moving straight to intubation. One respondent spoke of reversing the step-wise approach, by always choosing intubation first and moving to another airway management method only if intubation failed: Table 5, quote 4.

DISCUSSION

The findings from this study indicate that, in general, taking part in the AIRWAYS-2 trial was a positive experience for the participating paramedics. Locally delivered study training by competent practitioners and educators enhanced paramedic experience; the importance of such additional training was also identified in a previous study by Hargreaves et al. 2014.[4]

A study protocol that was easy to follow alongside a dedicated research paramedic for each EMS organisation allowed participants to feel supported by an individual who understood the challenging context of their work. Schmidt et al. (2009)[11] have previously commented that for OOH research to be successful the enrolment of patients into a research study must be simple and integrated into current practice as far as possible.

Paramedics felt that participating in research was important because they viewed their profession as needing context-specific high quality research that was otherwise lacking.[12] However, they also suggested that the absence of study support out of hours could leave them feeling isolated when issues arose during this time. Reduced support for out-of-hours research activity in critical care has also been cited as a barrier to research.[13] Paramedics indicated that a lack of OOH electronic study documentation led to inefficiencies within the research process, echoing previously reported concerns that additional research paperwork has the potential to interfere with operational service delivery.[4]

Participating paramedics reported some resistance amongst non-participating paramedics when they asked for the trial to be taken into account during the management of a cardiac arrest patient. This resistance to research in-time critical OOH situations has been reported previously.[14] Charlton et al. (2019)[15] explored how paramedics express preferences when including patients in research trials regardless of the scientific arguments for the necessity of research.

Participants' responses to questions about their preferred methods of airway management before and after the trial were unexpected, in that paramedics tended to report a prior preference for the technique to which they were subsequently allocated. Since paramedics were randomly allocated to the two arms these reported differences in prior preference are likely to reflect recall bias, and the effect of having become more familiar with one technique, potentially at the expense of the other, during the research itself. This is supported by the observation that paramedics also reported a preference for the technique to which they were randomised after the trial, though this effect was more marked for the i-gel than for tracheal intubation.

Participants indicated that their views had changed to favour a more stepwise approach to airway management. Conflicting views were expressed regarding the importance of intubation in OOH paramedic practice. Some participants seemed happy to relinquish this skill, whilst others felt that intubation remains essential in certain situations, particularly when a supraglottic airway device proves ineffective.

The views expressed by paramedics reflected those previously recorded in qualitative research[16] that followed REVIVE Airways, the feasibility study that preceded the AIRWAYS-2 Trial. Many paramedics in both studies were keen to retain the skill of tracheal intubation for use in those situations when other airway management techniques were considered inadequate, or where there had been failure to maintain an airway with a supraglottic airway device. In contrast to Brandling et al. (2016)[16] views concerning retention of the skill of tracheal intubation were expressed less strongly and less often; this is likely to reflect an ongoing shift of opinion over time amongst the paramedic workforce, and a greater acceptance of supraglottic airway devices into routine practice.

EMS providers reported differences in the training they had received to undertake tracheal intubation, and their experiences and confidence in using this method of advanced airway management in practice. This has been noted in previous research,[17] and may indicate educational changes and the growing use of supraglottic airway devices in EMS practice.

The theme of 'professional identity' has been explored previously by Burges et al. (2012),[14] and linked to the emerging professionalism of the paramedic role within the UK. The research findings presented here continue to demonstrate that paramedics are autonomous practitioners who can make decisions in the best interests of their patients, and in life-threatening circumstances.

LIMITATIONS

This study has some important limitations. Participants were asked to recall information regarding their views and preferences before study participation, this may have been up to 33 months preceding this research. Recall bias may have undermined the validity of responses, and influenced stated airway preferences between the two arms of the trial, both before and after the study.

33% of AIRWAYS-2 study paramedics participated in the online survey. Online survey response rates are typically in the range of 20-30%[10], however those study paramedics who did not participate may have had a different, and potentially less favourable, view when compared to those paramedics who engaged in this research.

There were a greater number of paramedics allocated to the intubation arm who volunteered to take part in the interviews than paramedics allocated to the i-gel arm (n=13 versus n=6). This suggests potential response bias; it is possible that paramedics in the intubation arm had stronger opinions regarding tracheal intubation that they wished to express, and those agreeing to interview may not have been representative of all trial participants. In addition, interviews were only conducted in one of the four participating ambulance services.

The use of IPA in this study may make it difficult to compare findings to other research in this area. IPA puts the reflexivity of the researcher at the centre of the research process and reflexivity was considered at each stage. The results presented here are a synthesis of the subjective influence of the researchers and the participants' expressions, however it should be noted that the researchers were also involved in the delivery of AIRWAYS-2, and some of the research team are also clinical practitioners responsible for the delivery of pre-hospital care.

CONCLUSION

Paramedics enjoyed participating in the AIRWAYS-2 trial and particularly valued the training and study support that were provided. Study paramedics felt more confident in their airway management practice as a result of trial participation. Paramedics allocated to the i-gel arm reported a stronger preference for the i-gel prior to the study and this increased following AIRWAYS-2. Paramedics allocated to the intubation arm reported a preference for tracheal intubation prior to the study and this preference increased slightly following AIRWAYS-2. Findings indicate existing variability in training, experience and confidence in tracheal intubation. Study paramedics expressed support for the stepwise approach to airway management, but also noted their unease about the potential to lose tracheal intubation from 'standard' paramedic practice, citing the ongoing need for intubation in certain clinical circumstances.

The views and experiences of EMS providers participating in AIRWAYS-2 have important implications for the planning and conduct of similar studies. The willingness of EMS providers to engage in future trials may be optimised by recognising the implications of this research.

REFERENCES

1. Benger JR, Kirby K, Black S, et al. Effect of a Strategy of a Supraglottic Airway Device vs Tracheal Intubation During Out-of-Hospital Cardiac Arrest on Functional Outcome: The AIRWAYS-2 Randomized Clinical Trial. *JAMA*. 2018;320(8):779–791.

2. Taylor J, Black S, Benger J, et al. Design and implementation of the AIRWAYS-2 trial: A multi-centre cluster randomised controlled trial of the clinical and cost effectiveness of the i-gel supraglottic airway device versus tracheal intubation in the initial airway management of out of hospital cardiac arrest. *Resuscitation* 2016;109:25-32.

3. Johnson R, Kuczawski M, Mason S et al. Why is it so difficult to recruit patients to research in emergency care? Lessons from the AHEAD study. *Emergency Medicine Journal* 2016;33(1):52-6.

4. Hargreaves K, Goodacre S, Mortimer P. Paramedic perceptions of the feasibility and practicalities of prehospital clinical trials: a questionnaire survey. *Emergency Medicine Journal*. 2014;31(6):499-504.

5. Watson DL, Sanoff R, Mackintosh JE. Evidence from the scene: paramedic perspectives on involvement in out-of-hospital research. *Annals of Emergency Medicine* 2012;60(5):641-50.

6. Likert, R. A Technique for the Measurement of Attitudes. *Archives of Psychology* 1932;140:1–55.

7. Lavrakas P J. (2008). *Encyclopedia of survey research methods* California:Sage Publications.

8. Smith J A, Flowers , and Larkin M. (2009) *Interpretative phenomenological analysis: Theory, method and research*. London:Sage.

9. Braun V and Clark V. Using thematic analysis in psychology. *Qualitative Research Psycholo*gy. 2006;3:77–101.

10. Safdar N, Abbo LM, Knobloch MJ, Seo SK. Research Methods in Healthcare Epidemiology: Survey and Qualitative Research. *Infection Control Hospital Epidemiology*. 2016;37(11):1272–1277.

11. Schmidt TA, Nelson M, Daya M. et al. Emergency Medical Service Providers' Attitudes and Experiences Regarding Enrolling Patients in Clinical Research Trials. *Prehospital Emergency Care.* 2009;13:160-168

12. Rhys M, Voss S, Davies S, Coates D and Benger J. Paramedic views on clinical research in cardiac arrest. *Journal of Paramedic Practice.* 2018;10(5):211-215.

13. Pattison N, Arulkumaran N, Humphreys S and Walsh T. Exploring obstacles to critical care trials in the UK: A qualitative investigation. *Journal of the Intensive Care Society*. 2017;18(1):36–46.

14. Burges Watson DL, Sanoff R, Mackintosh J. et al. Evidence from the scene: Paramedic perspectives on involvement in out-of-hospital research. *Annals of Emergency Medicine.* 2012;60(5):641-650.

15. Charlton K, Franklin J, McNaughton R. Phenomenological study exploring ethics in prehospital research from the paramedic's perspective: experiences from the Paramedic-2 trial in a UK ambulance service. *Emergency Medicine Journal* 2019;36:535-540.

16. Brandling J, Rhys M, Thomas M, Voss S, Davies S and Benger J. An exploration of the views of paramedics regarding airway management. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine* 2016;24:56.

17. Deakin CD, King P, Thompson F. Prehospital advanced airway management by ambulance technicians and paramedics: is clinical practice sufficient to maintain skills? *Emergency Medicine Journal* 2009;26:888-891

Figure 1: Participants' experience of taking part in AIRWAYS-2

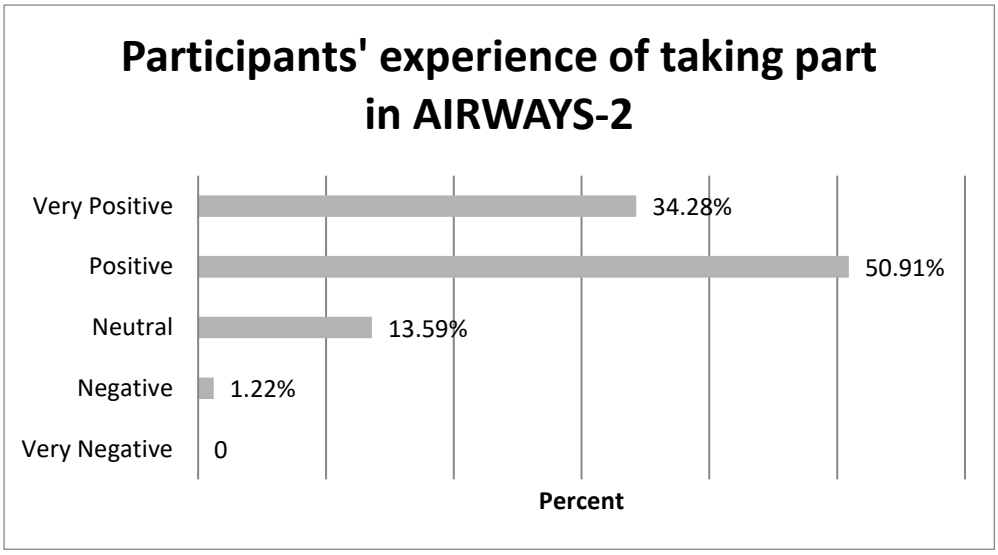

Figure 2: Ease of adhering to the AIRWAYS-2 study protocol

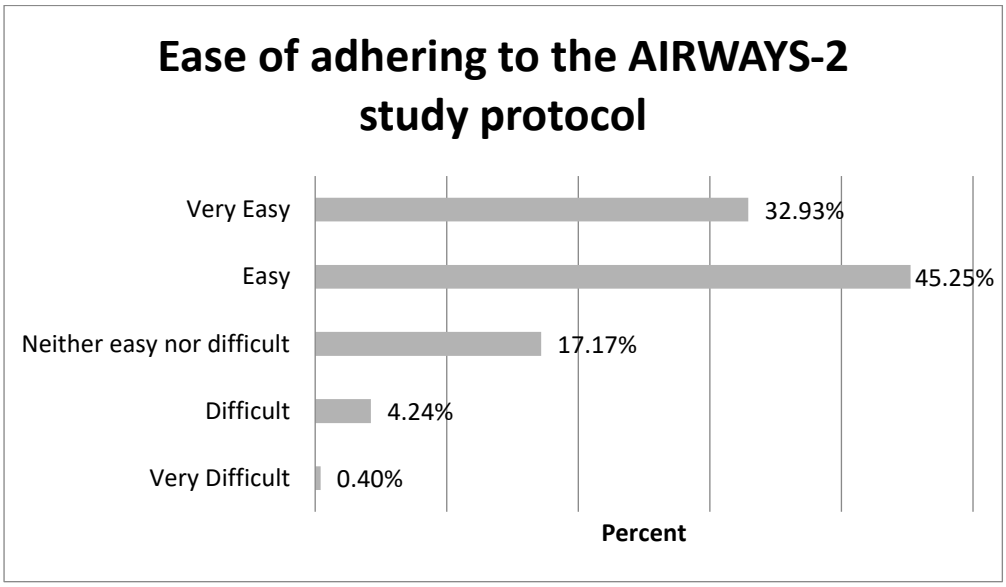

Figure 3: Study paramedics preferred method of airway management in the i-gel arm before and after participation in AIRWAYS-2

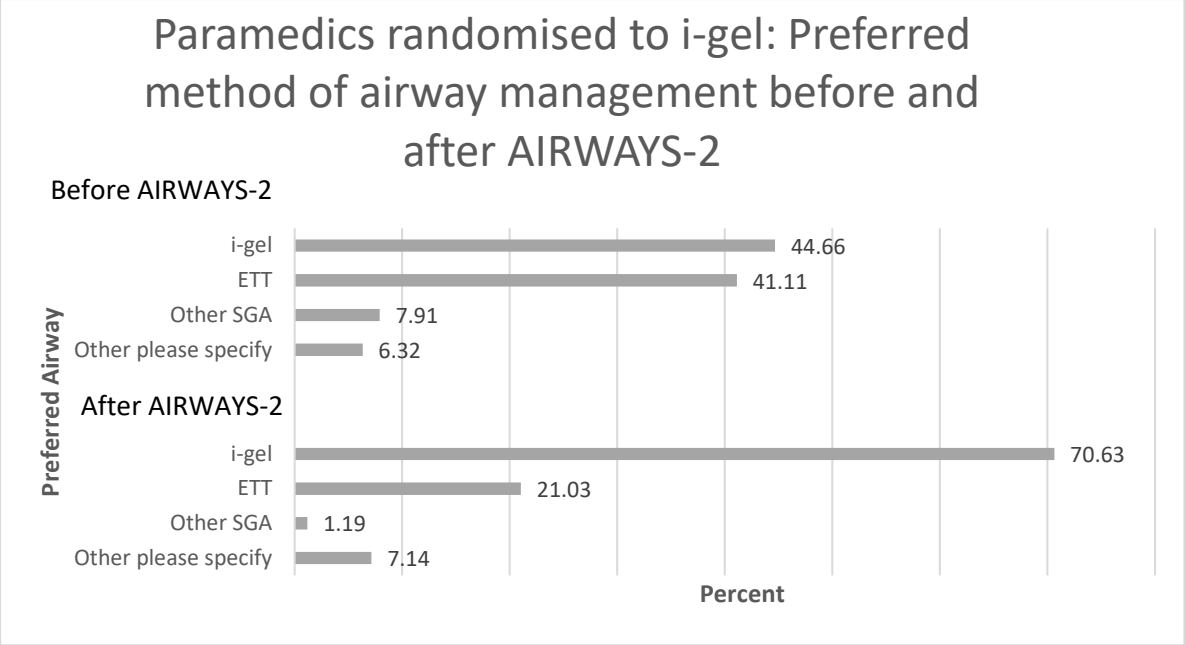

Figure 4: Study paramedics preferred method of airway management in the tracheal intubation arm before and after participation in AIRWAYS-2

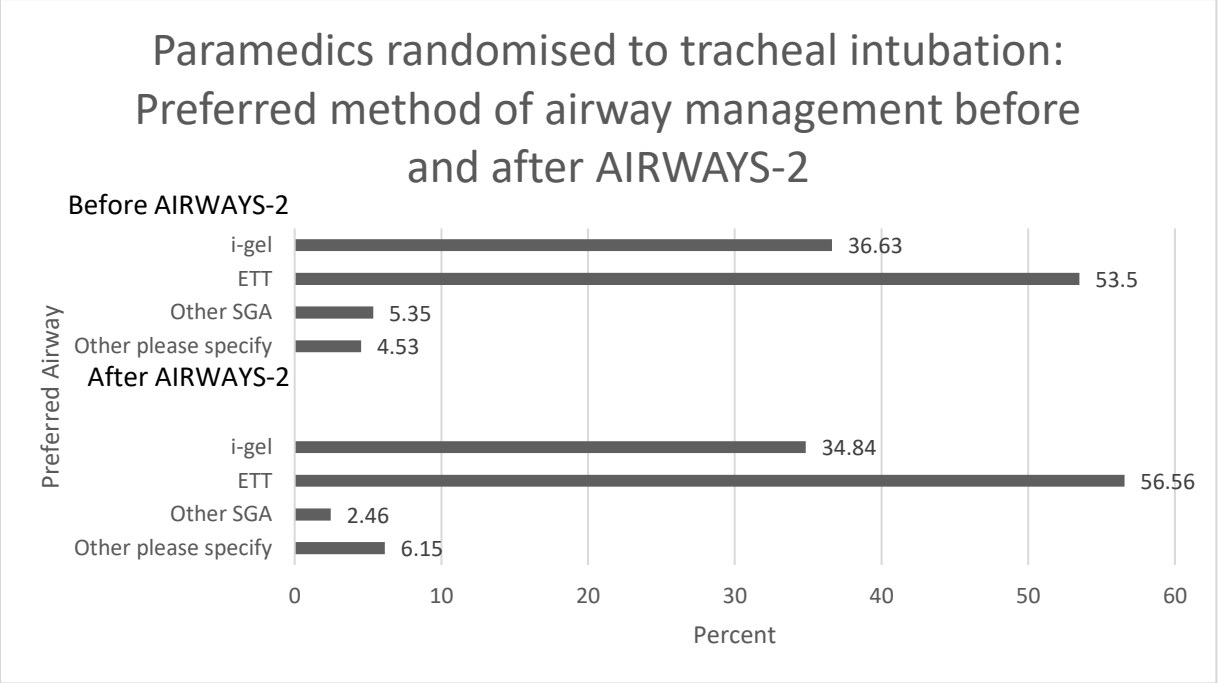

Table 1: Research process

Quote no	Quote	Data source
1	*"It was really, really enjoyable. I felt really supported and although I didn't always remember the exact things to fill in on the sheet, I got a lot of support from [Name of Research Paramedic] whenever I needed to ask some questions".*	*interview participant 18*
2	*"… because of working nights, say three, four o'clock in the morning, it would've been nice to have had someone to pick up the phone to and say look, can I get some advice? But of course, that doesn't happen all the time, research generally only happens nine to five, whereas, of course, the research subjects happens twenty-four-seven. So that would've been useful to have somebody that was on the end of the phone immediately".*	*interview participant 6*
3	*''…Really good having the trainers come to local station rather than having to travel for miles!...''.*	*online survey participant*
4	*"...getting some good refresher training and/or experience from people more adept than me was a good benefit...".*	*interview participant 9*
5	*"...there must be a better more convenient electronic way to deal with it, which harvests information from what we've already put in our electronic record".*	*interview participant*
6	*"I think the biggest challenge, and even then it was only very short-lived, was having to get other people on the scene to... appreciate the study criteria and to appreciate that we have to follow the format that we've been given of having a second attempt … there were a couple of people that were saying let's just get an i-gel in, let's just you know tie it down…".*	*interview participant 18*

Table 2: Changes in views and practice

Quote no	Quote	Data source
1	*"Paramedic for almost 30 years, intubation was the only advanced airway management technique for a lot of that time and I had a bias towards it. The study made me appreciate that whilst intubation has its place in managing difficult airways, in the majority of patients the i-gel is quicker and effective, with a lower element of risk".*	*online survey respondent*
2	*"I am happy to lose ET tubes now whereas before I felt they were essential".*	*online survey respondent*

Table 3: Engagement with research

Quote no	Quote	Data source
1	*"… I think research for paramedics is absolutely essential, because it is a very unique environment that is different to working in hospital. You're usually the autonomous clinician working on things, making decisions for patients. And there's very little research. So I'm very, very keen to get involved, and any research that moves our professional practice forward, really. And I think the question that Airways raised absolutely needed answering. You know, which is better for our patients? At the end of the day, I personally always want to do the best for our patients, and we need to know what that is. So yeah, I was happy to take part".*	*interview participant 3*

Table 4: Professional identity

Quote no	Quote	Data source
1	*"..I think there are some people that still believe the hype that endotracheal intubation is the gold standard and nothing else comes close..".*	*interview participant 9*
2	*"... I think there's been a lot of scepticism for a long time about whether ... as paramedics, should be intubating, and I think probably it will be grabbed hold of to try and persuade that we … shouldn't be intubating, we should be using LMA".*	*interview participant 11*
3	*"I used to favour i-gel anyway. The study has cemented its use in my mind but I still like to know I have ET intubation as a back-up as I am of the opinion that an SGA is not 100% appropriate".*	*online survey respondent*
4	*"... I think that the cases where intubation really comes into it, where we do really think it does make a difference, upper airway burns, anaphylaxis, asthma, things like that, I think that's perhaps something that needed to be looked at".*	*interview participant 18*
5	*"...I think the majority of us follow a stepwise approach.... there are certain paramedics I can think that always tube. And will always go for a tube... I don't think always in the right circumstances. I don't always think it's in the best interests of the patient.... maybe it's just they want to keep their skills up and if there's an opportunity to intubate, they want to intubate".*	*interview participant 7*
6	*"… I actually think the demographic's changed and we've got a new wave of paramedics and a new skill set and a lot of changes. And I think, actually, that that's a factor that needs to be taken into consideration when you look at the impact of the study. I just think culture and demographics changed while the findings came out".*	*interview participant 13*

Table 5: Procedural competence

Quote no	Quote	Data source
1	*"I'll always now try an i-gel first. Because it is both quick and simple and I'm minimising time off the chest and you're minimising time not ventilating the patient".*	*interview participant 14*
2	*"But I have had instances .. since the trial, where the i-gel just doesn't fit. And we've had to then intubate. And I think since the trial I've had at least one choking, where we've had to go in with a laryngoscope anyway, to find out if we can see the obstruction. So we've intubated at the same time".*	*interview participant 14*
3	*"… I think if anything it just gave me a greater understanding of that system, and a greater respect for using the step-wise approach. Because that step-wise approach isn't about whether the airway's failing or whether it's appropriate, it's about the whole logistics and the whole management of that patient".*	*interview participant 2*
4	*"looking at it from .. my point of view now, it's more stepwise, whether it be the other direction ... if you're not confident with a tube, drop to an i-gel. If that's not working, drop to an OP".*	*interview participant 19*

Appendix One

Online Survey Questions

Demographics

1. Which age range do you correspond to?
    - 18-24 years old
    - 25-34 years old
    - 35-44 years old
    - 45-54 years old
    - 55-64 years old
    - 65-74 years old

2. What was your training route to becoming a paramedic?
    - IHCD
    - FdSC
    - BSc
    - DipHe

    Other – Please specify

3. Which Ambulance Trust were you employed in when you were participating as a study paramedic in AIRWAYS-2?
    - East of England Ambulance Service
    - East Midlands Ambulance Service
    - South Western Ambulance Service
    - Yorkshire Ambulance Service

4. For long did you participate in the AIRWAYS-2 Study?
    - 1-6 months
    - 7-12 months
    - 13-18 months
    - 19 – 24 months

Participation Details

5. Which arm of the study were you allocated to?
    - i-gel
    - ETT

6. How would you rate the study preparation/ training?
    - Excellent
    - Good
    - Fair
    - Poor
    - Bad

Specific comments or recommendations you would like to make/feedback to the study team.
Free text box

7. How many patients were you able to recruit into the study?

Free text box

Experience of participation

8. How would you describe your experience of taking part in this study?
    - Very positive
    - Positive
    - Neutral
    - Negative
    - Very negative

Free text box

9. Based on your experience would you consider participating in a similar study in the future?
    - Yes
    - No

10. How would you rate the ease of adhering to the study protocol?
    - Very easy
    - Easy
    - Neither easy or difficult
    - Difficult
    - Very difficult

11. Please list any factors that supported your participation in the study
    Free text box

12. Please list any factors that made your participation in the study difficult.
    Free text box

13. How would rate the support you received regarding your participation in the study?

    - Very dissatisfied with the support
    - Dissatisfied
    - Neutral
    - Satisfied with the support
    - Very satisfied with the support

14. What was your preferred method of initial advanced airway management prior to participating in this study?
    - i-gel
    - Other SGA
    - ETT
    - Other

    Please give reasons for these views:

Free Text box

15. What was your preferred method of advanced airway management after participating in this study?
    - i-gel
    - Other SGA
    - ETT
    - Other

Please give reasons for these views:

Free text box

Changes in views and clinical practice

16. Has your **practice** around advanced airway management changed as a result of participation in AIRWAYS-2?
    - Yes
    - No

Pease give reasons:

Free text box

17. Have your **views** around advanced airway management in the OHCA patient changed as a result of participating in AIRWAYS-2?

- Yes
- No

Please give reasons:

Free text box

General

18. What comments would you make to a colleague considering participating in a similar study?

Free text box

Appendix Two

Interview Guide

Initial Questions

How long have you been a paramedic?

What is your current role in the ambulance service?

What was your route to qualifying as a paramedic?

1. **Experiences of taking part in the AIRWAYS-2 Study**

   Do you think that pre-hospital research is important?

   Have you ever taken part in pre-hospital research before participating in AIRWAYS-2?

   Tell me about your experiences of taking part in AIRWAYS-2?

2. **Challenges of participating in AIRWAYS-2**

   How many patients did you enrol into the trial?

   Which arm were you allocated to?

   How did you find this?

   Was there anything challenging about the being a study paramedic in AIRWAYS-2?

   How did you feel about automatically enrolling patients into the trial without taking consent?

   1. auto enrolment (do they understand what this meant in practice)
   2. waiver of consent

   Intubation Arm Only – If you were the intubation arm what do you think of the relatively low rates of intubation success in the trial? Do you feel competent in intubation?

3. **Support for participation in AIRWAYS-2**

   Was there anything that made your participation in the trial easy?

4. **Expected results**

   Have you read the AIRWAYS-2 paper since it's been published?

   What did you think of the results?

5. **Changes in views and practice on airway management in out-of-hospital cardiac arrest as a result of participation in AIRWAYS-2**

   Do you think that your views around airway management in cardiac arrest have changed since participating in AIRWAYS-2?

6. **How will the results of AIRWAYS-2 impact on paramedic practice?**

   Do you think participating in the AIRWAYS-2 trial has changed your practice at all?

   Do you think that now the trial has published that it will make any difference to the way you practice?

   Do you think it will change the practice of your colleagues in prehospital care?

   Do you think the trial will impact on future paramedic practice and clinical guidelines?

   Closing
   Is there anything else you would like to say about your participation in AIRWAYS-2 and how it may have changed your views and practice?

   Thank you for taking part in this research.