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Preferences for centralised emergency medical services: a discrete choice experiment

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Title: Preferences for centralised emergency medical services: a discrete choice experiment

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ABSTRACT

Objectives

It is desirable that public preferences are established and incorporated in emergency healthcare reforms. The aim of this study was to investigate preferences for local versus centralised provision of all emergency medical services (EMS) and explore what individuals think are important considerations for EMS delivery.

Design

A discrete choice experiment was conducted. The attributes used in the choice scenarios were: travel time to the hospital, waiting time to be seen, length of stay in the hospital, risks of dying, readmission, and opportunity for outpatient care after emergency treatment at a local hospital.

Setting

North East England

Participants

Participants were a randomly sampled general population, aged 18 years or above.

Primary and Secondary Outcome measures

Analysis used logistic regression modelling techniques to determine the preference of each attribute. Marginal rates of substitution between attributes were estimated to understand the trade-offs individuals were willing to make.

Results

Responses were obtained from 148 people (62 completed a web and 86 a postal version). Respondents preferred shorter travel time to hospital, shorter waiting time, fewer number of days in

hospital, low risk of death, low risk of readmission and outpatient-follow up care in their local hospital. However, individuals were willing to trade-off increased travel time and waiting time for high quality centralised care. Individuals were willing to travel nine minutes more for a one day reduction in length of stay in the hospital, 38 minutes for a 1% reduction in risk of death and 112 minutes for having outpatient follow-up care at their local hospital.

Conclusions

People value centralised EMS if it provides higher quality care and are willing to travel further and wait longer.

Strengths and limitations of this study

- The findings of this study might inform decision makers redesigning emergency medical services about preferences of potential users of that service.
- Participants were randomly sampled from specific population groups registered with Healthwatch or Northumbria Healthcare NHS Foundation Trust, and therefore may not represent the general population.
- The attributes used in the DCE and their levels were framed to closely represent emergency care in NHS England, however some other important attributes may have been left out.

BACKGROUND

The National Health Services (NHS) in the United Kingdom (UK) faces growing service demands, clinical care standards and costs which threaten its sustainability and financial stability.[1] A radical and transformative change is essential for the NHS to maintain safety and quality, but this may reduce immediate access to care for some patients. While all areas of healthcare face challenges and major changes in service provision, those faced by acute hospitals are significant because outcomes can depend upon time-critical treatments, demand is rising annually and they are supported by a major proportion of the healthcare budget.[2]

In the UK, consolidation of specialised medical care is one of the service models envisaged by the NHS "Five year forward view".[3] It is recommended that emergency care be reconfigured into larger specialised emergency units providing earlier multidisciplinary expertise and associated facilities.[4] Whilst there exists some condition specific evidence that centralisation of specialist services yields better clinical outcomes and savings,[5-7] there are arguments against centralisation in term of poorer access, increased travel time and costs, as well as preferences expressed by patients and the public around the provision of local services.[8-12]

Understanding public preferences about the location and nature of healthcare providers has become an important influence upon policy and many European countries have incorporated this information into decisions about the organisation of their healthcare systems.[13] Incorporating patient views in healthcare policy decisions may improve the uptake and efficiency of services. However, little is known about preferences for the centralisation of emergency medical services.

The aim of this study was to examine public preferences for the different attributes of centralised emergency medical services in England, reported using trade-offs between attributes which reflect the key consequences.

METHODS

A discrete choice experiment (DCE) was used to explore preferences. DCEs provide rich data sources for economic evaluation and decision-making and offer several other advantages compared to other stated preference elicitation methods.[14,15] DCEs involve presenting individuals with a series of hypothetical choices which differ in attributes (characteristics) and their magnitude or levels, and ask them to choose the alternative they prefer in each set. The choices that individuals make from a DCE survey enable researchers to understand the value that individuals place on various levels of healthcare provision attributes. A DCE also allows quantification of the relative importance of attributes in terms of willingness to pay and marginal rates of substitution.[16]

Attributes and level

The attributes associated with centralisation were identified from literature[17-21] and also reflected the key performance measures commonly used in emergency medical services[22] and key quality indicators in NHS England (Table 1).[10,23,24] The identified attributes were assigned levels that were realistically applicable within the UK NHS.[25]

Table 1. Attributes and levels used in the DCE

Attributes	Levels
Travel time to hospital	< 30 min,1 hour,1 and half hours,2 hours or more
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	30 min,1 hour,2 and half hours,4 hours or more
Length of stay at the hospital before going home	1 day or less, 3 days, 5 days, 6 days or more
Risk of dying from the illness	Low (Less than 1 in 100 patients), Mild (3 in 100 patients), Moderate (5 in 100 patients), High (More than 7 in 100 patients)
Risk of being re-admitted to the hospital after going home	Low (Less than 1 in 100 patients), Mild (3 in 100 patients), Moderate (5 in 100 patients), High (More than 7 in 100 patients)
Outpatient care after emergency treatment	At your Local hospital, At a hospital which is about an extra 1 hour travel time from your local hospital

Questionnaire design

A full factorial design incorporating all possible combinations of attributes and levels would have resulted in 2128 (i.e. 4^5X2^1) possible scenarios. Therefore, an efficient design, which maximises the statistical efficiency of designs by minimizing the predicted standard errors of the parameter estimates (usually the D-error statistic) was used.[26] An efficient fractional factorial design[26,27] still generated 20 choice sets. To minimise the potential cognitive burden to the respondents, the choice sets were blocked into two, with each block having 10 choice sets (see Figure 1 for a choice set example). The prior[28] estimates of attribute coefficients used were derived from a pilot survey (see below). A further three choice sets were added to each block as tests of transitivity[29,30] and monotonicity[29]- which are tests of theoretical validity and rationality of choice sets used in the DCE. Theoretical validity and rationality checks assessed whether the parameters moved in the expected

direction. For example, it was expected that shorter travel time to a hospital is preferred over longer travel time duration. Further details on transitivity and monotonicity tests used are in the supplementary file.

Altogether, the final design included 13 choice sets in each of the two blocks of DCE choice sets, which were randomly allocated to participants. Choice sets were defined as efficient design using Ngene software version 1.1.1.[31]

The questionnaire also included questions on socio-demographic information such as gender, age-group, and generic health information. Also included was a question asking the respondents how difficult the DCE task was for them. The respondents were asked to make a forced choice between two alternative hospitals; an opt-out alternative of "no treatment" in a healthcare emergency lacked realism.

Pretesting and piloting

The understanding of the attributes and levels was pre-tested in-house among members of the Institute of Health & Society, Newcastle University and piloted on a small non-random sample of potential participants (n=26). Following the pre-test and pilot, the wording and display of the survey introduction and the choice sets were revised and simplified. The attribute coefficients generated from the pilot were used as priors in the final questionnaire described earlier.

Sample

The survey sample was recruited from the general public over 18 years of age either registered with Healthwatch Northumberland network or with Northumbria Healthcare NHS Foundation Trust. Participants were approached between January-April 2016. The sample represented a general

population whose EMS had recently been centralised. Grounded on the recommendations to centralise EMS[3,4], a new specialised emergency care hospital was built at Cramlington in Northumberland, the first of its kind in the UK, with the aim to provide improved quality of care by providing faster access to consultants and diagnostics.[10] Before June 2015, the emergency medical services were provided from the A&E departments at three general hospitals within the area: North Tyneside, Wansbeck and Hexham. All of these hospitals are operated by Northumbria Healthcare NHS Foundation Trust and they accounted for 90% of all A&E visits by the population of Northumberland[10]. The emergency care provided by the three general hospitals was centralised into the new specialised hospital.

Data were collected using postal questionnaires and online. Potential respondents with an email address registered were sent an electronic link to the survey hosted by an online commercial platform, Qualtrics (www.qualtrics.com). Whereas those without email access were sent a paper-copy of the survey. Participants previously identified with visual impairments were sent a paper format of the questionnaire in large font size. The invitation to complete the survey questionnaire explained a description of each of the characteristics used, and how the responses would be used. A clear statement of voluntary participation was included.

Data analysis

The survey data analysis was based on the random utility framework- the underlying theory that underpins the DCEs.[32] It has been argued that failure of a validity test would not necessarily mean the respondent was irrational and deletion of responses that fail the validity tests may result in removal of valid preferences which may lead to biased results.[29] Moreover, random utility theory is expected to be robust to such violations in validity tests.[29] Furthermore, qualitative research in this area[33,34] also revealed that respondents failing the validity tests had rational reasons for doing

so. Therefore, all respondents regardless of failing the validity tests were included in the final analysis.

A range of logistic regression modelling approaches were used. Multinomial logit (MNL) (also known as conditional logit analyses), mixed multinomial logit (MIXL) and generalised multinomial logit (GMNL) models were fitted to estimate changes in the preference or utility of each attribute.[35] MNL assumed homogenous choice across the respondent sample and also assessed the significance of attribute interactions with respondent characteristics. However, the MNL models are based on assumptions of independence of irrelevant alternatives (IIA), independence and identical distribution of error terms (IID) across observations and no heterogeneity across respondents. This may be restrictive and limited in describing human choice behaviour.[35] Therefore the MIXL model,[36,37] a popular extension of the MNL model was also used, which while keeping the IID and not making the IIA assumptions eliminates the limitations of MNL and allowed for choice heterogeneity across respondents. It has been argued that GMNL model allows for the scale heterogeneity by accounting for some respondents who exhibit more random (i.e. relatively insensitive to attributes) and extreme choices (i.e. near lexicographic-always choosing a particular attribute regardless of others), and thus offers a better fit; outperforming the MIXL model.[38] Therefore, GMNL model was also used in the analysis. A constant term was not included. Akaike information criterion (AIC) and Bayesian information criterion (BIC) were used as measures of the model fit. The lower the AIC and BIC measures the more preferred is the model.[39]

Marginal rates of substitution (MRS) were calculated, across all models (to account for the models limitations described earlier), to compare respondent preferences on a common value scale and understand the trade-offs made between two-attributes. MRS values were computed using travel time to hospital and time waiting to be seen to present the preferences, so that the trade-offs could

be compared in terms of willingness to travel and willingness to wait. All analyses were undertaken using R statistical programme version 3.2.4.[40]

Patient and public involvement

No patient or public were involved in the design, conduct and reporting of this research. Nevertheless, the priors generated from a pilot study conducted in a sample of general population informed the design of the DCE survey.

Ethics approval

Ethics approval for the DCE survey was provided by Newcastle University Faculty of Medical Sciences Ethics Committee (approval code 00893/2015). Specific written consent was not obtained from participants, but they were made aware that the participation in the survey was voluntary and returning a completed questionnaire was an indication of consent. No personal identifiable information was collected and all data from participants were anonymous. The survey data and other related materials were handled in accordance with the Newcastle University's rules and regulations in place with strict adherence to *The Data Protection Act 1998,* the law in force at the time of the survey, and the *Newcastle University Information Security Guidelines* (http://www.ncl.ac.uk/data.protection/policy.htm).

RESULTS

In total, 148 respondents completed the survey: 62 online and 86 on paper. Whilst the response rate in the survey sent by post was 13%, it was not possible to assess the response rates in the web version of the survey as we could not verify how many had received the link. However, the web-link was opened on 101 occasions and the response rates in terms of those opening the web version

was about 61%. Among the respondents, 44% reported (answered the survey question on difficulty in completing the DCE) some form of difficulty in completing the choice sets.

Respondent characteristics

Among the 148 respondents, there were almost twice the number of females compared to males (Table 2). Most respondents aged more than 55 years of age. About half of the respondents had some form of emergency experience in the immediate 12 months before the survey. The general health measures (EQ-VAS=75.5, EQ-5D-5L=0.77) is similar to that estimated for the UK general population above 55 years of age.[41]

Table 2. Summary of respondent characteristics

Characteristics	All
Sample (n)	148
Age groups	
16-29	4 (2.70%)
30-34	6 (4.05%)
35-39	5 (3.37%)
40-44	4 (2.70%)
45-49	9 (6.08%)
50-54	12 (8.10%)
55-59	19 (12.84%)
60-64	21 (14.19%)
65-69	27 (18.24%)
70-74	17 (11.48%)
75-79	9 (6.08%)
80-84	9 (6.08%)
85+	6 (4.05%)
Gender	
Male	49 (33.10%)
Female	98 (66.21%)
Prefer not to reveal	1 (0.67%)
Self-reported health	
Mean EQ-VAS score (SD)	75.50 (20.48)
Mean EQ-5D-5L score(SD)	0.77 (0.22)
Emergency experience	
Yes	78 (52. 70 %)
No	70 (47.30%)

Regression analysis of the DCE data

Two respondents failed the validity tests. However, an initial regression analysis indicated that the coefficient estimates remained similar regardless of whether those respondents failing the validity tests were included or excluded in the analysis. Therefore, the results on these studies are based on analysis of data from all respondents regardless of failing the validity tests.

Table 3 presents the regression analysis when all the attributes are taken to be continuous. The negative and positive signs in the coefficients indicate preference of a lower level and higher level of an attribute respectively. The coefficient estimates were in line with expectations that individuals would prefer shorter travel time to the hospital, shorter waiting time to receive the service, fewer number of days of length of stay in the hospital, low risk of death, low risk of readmission and outpatient follow-up care after the emergency treatment in their local hospital.

Table 3. Regression results

Attributes	MNL (Main effects)	MNL (Including respondent characteristics)	MIXL (Main effects)		GMNL (Main effects)	
	Coefficients (SE)	Coefficients (SE)	Coefficients (SE)	SD (SE)	Coefficients (SE)	SD (SE)
Travel Time	-0.0086 (0.0009)***	-0.00068 (0.0032)	-0.0125 (0.0020)***	0.0165(0.0024)***	-0.0235 (0.0097)*	0.0254 (0.0091)**
Waiting Time	-0.0056 (0.0005)***	-0.00333(0.0015)*	-0.0077 (0.0008)***	0.0048(0.0009)***	-0.0146 (0.0059)*	0.0078 (0.0028)**
Length of Stay	-0.0768 (0.0152)***	-0.0784(0.0153)***	-0.1217 (0.0262)***	0.1608(0.0395)***	-0.2501 (0.1149)*	0.2668 (0.1264)*
Risk of Death	-0.3258 (0.0202)***	-0.1953(0.0553)***	-0.4623 (0.0425)***	0.2577(0.0434)***	-0.8409 (0.3184)**	0.3930 (0.1478)**
Risk of Readmission	-0.1442 (0.0159)***	-0.0192 (0.0518)	-0.1803 (0.0262)***	0.1384(0.0386)***	-0.3436 (0.1491)*	0.2210 (0.1171)
Outpatient Follow-Up	-0.9624 (0.0776)***	-0.9887(0.0792)***	-1.2442 (0.1424)***	0.7290(0.1826)***	-2.2214 (0.8883)*	1.5190 (0.1478)*
Interaction terms						
Travel Time*Gender	-	-0.0049 (0.0019)**	-	-	-	-
Waiting Time*Gender	-	-0.0021 (0.0009)*	-	-	-	-
Waiting Time*Survey Mode	-	0.0027 (0.0008)***	-	-	-	-
Risk of Death*Gender	-	-0.1047 (0.0327)**	-	-	-	-
Risk of Death*Survey Mode	-	0.0862 (0.0291)**	-	-	-	-
Risk of Readmission*Gender	-	-0.0775(0.0297)**	-	-	-	--
Sample size (Observations)	148(2960)	148(2960)	148(2960)	-	148 (2960)	-
Log Likelihood	-813	-800	-763	-	-757	-
AIC	1640	1623	1522	--	1544	-
BIC	1670	1687	1621	-	1624	-

***p<0.001, **p<0.01, *p<0.05; SE=Standard Error, SD= Standard Deviation; AIC= Akaike information criterion; BIC = Bayesian information criterion

Table 3 also assessed the significance of attribute interactions with respondent characteristics. None of the attribute interactions with respondent age and self-reported health measures were significant which ruled out important differences in preferences of emergency healthcare because of age and health status. Only interactions (Travel Time* Gender, Waiting Time * Gender, Waiting Time* Survey Mode, Risk of Death* Gender, Risk of Death* Survey Mode, Risk of Readmission*Gender) were significant and these were considered in the final specification (Table 3). Results suggest that men have stronger preferences for shorter travel time (-0.0049, p<0.01), shorter waiting time (-0.0021, p<0.05), lower risk of death (-0.1047, P<0.01) and lower risk of readmission (-0.00775, P<0.01) compared to women. Respondents completing the web-based survey showed stronger preferences for less waiting time (0.0027, p<0.001) and lower risk of death (0.0862, p<0.01) compared to those completing the survey in paper. In the MIXL model, the significance of attributes remained the same as in MNL model, however, lower AIC and BIC in the MIXL indicated that it provided a better model fit compared to MNL model. Furthermore, the MIXL model identified heterogeneity among respondents (shown by the statistically significant standard deviations). This suggested that MIXL was more appropriate that the MNL model. In the GMNL model, the coefficient estimates retained the signs and significance similar to MNL and MIXL.

Table S1 (In Supplementary File) reported the analysis when risk of readmission", risk of death and outpatient follow-up were treated as categorical variables as opposed to continuous variables as they were in Table 3. There was no evidence of any difference in preferences for the different levels of "length of stay" in the MNL model. Furthermore, in all three of the statistical models (MNL, MIXL, GMNL), there was no evidence that preferences for the mild of "risk of death" were any different to the reference category (low risk of death (1 in 100)) across all three models. The magnitude of the coefficients increased in line with the increase in the levels of "risk of readmission" and "outpatient follow-up", however coefficients for increasing levels of "risk of readmission" did not increase in a linear manner and there was no evidence that the mild "risk of readmission" was preferred to low risk of readmission.

Marginal rates of substitution

The coefficients generated from each of the different regression models in Table 3 were used to calculate the marginal rates of substitution (MRS) in Table 4. The MRS in Model 1A indicated that participants were willing to travel nine minutes more and willing to wait 14 minutes more for a one day reduction in length of stay in the hospital. The willingness to travel increased to 38 minutes and the willingness to wait increased to 58 minutes for one percent reduction in risk of death in hospital. The willingness to travel was 112 minutes and willingness to wait was 172 minutes for having outpatient follow-up care after the emergency treatment at their local hospital. In Model 1B the coefficients of travel time and risk of readmission used to generate the MRS were not significant, therefore the marginal willingness to travel across all attributes and marginal willingness to wait derived for the attribute risk of readmission were not significant. Nevertheless, the MRS estimates in all the models (except Model 1B) were generally similar.

Table 4. Marginal rates of substitution in terms of willingness to travel and willingness to wait

Attributes	Marginal rates of substitution								Condition
	MWT (in minutes)				**MWW** (in minutes)				
	Model 1A	**Model 1B**	**Model 1C**	**Model 1D**	**Model 1A**	**Model 1B**	**Model 1C**	**Model 1D**	
Length of stay	8.93	115.29	9.74	10.64	13.71	23.54	15.81	17.13	For 1 day reduction in length of stay in hospital
Risk of Death	37.88	287.21	36.98	35.78	58.18	58.65	60.04	57.6	For 1% reduction in risk of death in hospital
Risk of Readmission	16.76	28.24	14.42	14.62	25.75	5.77	23.42	23.53	For 1% reduction in risk of readmission in hospital
Outpatient Follow-Up	111.90	1453.97	99.54	94.53	171.85	296.91	161.58	152.2	For having outpatient follow- up care at their local hospital

MWT- Marginal willingness to travel; MWW- Marginal willingness to wait; Model 1A- Main effects MNL, Model 1B- With interactions MNL, Model 1C- Main effects MIXL, Model 1D- Main effects GMNL

DISCUSSION

Summary of the findings

This examination of public preferences demonstrated the influence of attributes on the choice of hospitals in an emergency healthcare situation. In general, participants preferred shorter travel times, shorter waiting times, fewer number of days in hospital, low risk of death, low risk of readmission and local outpatient follow-up. Gender influenced the strength of the preference, with results suggesting that men have stronger preferences for shorter travel time, shorter waiting time, lower risk of death and lower risk of readmission compared to women. However, there was no evidence of influence of other characteristics such as age, recent experience of emergency care and current health state of the individual.

The results indicate that if centralisation of emergency medical services increases travel and waiting times, but offered better care in terms of reduced risk of death, reduced length of stay, reduced risk of readmission and provisions for follow-up care in the local hospital, then participants would prefer the centralised service. Travelling 38 minutes longer by ambulance and waiting about an hour more for 1% reduction in risk of dying seems reasonable. The participants valued the opportunity for follow-up at their local hospital more than any other attributes examined in this DCE. Though traveling about 2 hours longer and waiting about 3 hours more may appear unrealistic value placed on local outpatient follow-up, these possibly reflect the feeling of emotional attachment and enormous pride of people towards their local NHS hospital.[42] However, it was also found that the centralised hospital should also not be too far away to be acceptable (not needing more than two hours of additional travel time).

Comparison with other studies

While differences exist between studies in terms of healthcare context, design, attributes and levels used, the findings of this study are in line with other relevant DCE studies. Earlier studies attempting to quantify the strengths of individual preferences for unscheduled healthcare available during usual GP service hours have indicated that patients prefer shorter waiting times to get a decision on treatment and that services are provided closer to their homes.[20,43] Unlike our study, these studies reported age related differences in strength of preferences: younger age groups (<45 years) held strong preferences with respect to the way of making contact with the healthcare system. A study on Australian public's choice among alternatives of emergency care reported clear preferences for shorter waiting times and strong emphasis on the quality of emergency healthcare service.[44] A significant preference heterogeneity was observed in this study and the strength of the preference changed according to the presenting context and situation such as the perceived severity of illness and who was being treated, but the influence of age and gender was not reported. Another DCE study which examined the factors influencing the choice of hospitals in London patients on waiting lists of range of non-emergency situations demonstrated that individuals prefer shorter travel time to hospital, shorter waiting time to receive the service, the follow-up care at their home hospital and a high valuation of hospital reputation.[19] This study reported differences in preferences in patient related to gender and age. Potential patients in Germany were willing to sacrifice longer travel distance and preferred location of care for a highly specialised surgical care provision with shorter waiting times,[45] but the influence of respondent age and gender was not reported.

It is not surprising that non-emergency situations show similar results. A recent study assessing preferences for centralising specialist cancer services also found that patients, health professionals and the public all prefer shorter travel times, lower risk of death and complications, and better access to specialist centres.[46] However, there was no evidence of

differences because of gender, age or place of residence of the respondents. Risk of death and risk of complications were ranked highly whereas relatively lower importance was given to travel time.

Implications of the study findings

This study reveals preferences and the trade-offs individuals are willing to make across hospital attributes when choosing hospitals for emergency healthcare. The findings provide valuable insights for decision-makers in relation to the centralisation of emergency healthcare services. Contrary to the concerns about distance decay,[11,12] where the utilisation of healthcare services decreases with the increase in travel time to healthcare facilities, the findings suggest that whilst people may place a high value on their local hospital, in an emergency situation they may be willing to exchange increased journey time for better quality of care. This assumes that the ambulance response would be the same, and that other aspects of local services would not be affected. The preferences are not influenced by age, health status or previous experience of emergency medical services, suggesting that services do not necessarily have to be tailored according to age-groups or health status, at least within the range of respondents studied. However, it was observed that there are gender differences in the strength of the preferences, which could possibly be related to the differences in knowledge, attitudes and previous healthcare experiences between men and women.[47] Whilst this finding may specifically reflect this cohort and the smaller number of males that participated, it is recommended that future researchers and healthcare providers consider whether decisions and communication about centralising services should be sensitive to gender differences. Overall, the DCE results support policy recommendations to centralise emergency medical care in local hospitals into fewer specialised high performing units,[3,4] as long as journey times are not excessively long and after-care can be provided locally.

Strengths and limitations

The findings of this study should be interpreted in light of some strengths and limitations. We attempted to study a wide cross section of the local general population representing the preferences of potential users of a newly built emergency hospital. However, it only represents specific population groups registered with the Healthwatch or Northumbria Healthcare NHS Foundation Trust, and sampling bias cannot be ruled out. Whilst DCE offers several advantages over other preference elicitation methods used in healthcare, concerns have been expressed about their external validity.[48] Despite a high proportion of complete and correct responses in the DCE, a number of participants found the choice tasks difficult to complete which could mean the attributes were not appropriate to them and the choices were arbitrarily made. Furthermore, the attributes used in the DCE were taken from the literature without local qualitative research[49] and some other important attributes may have been left out. The attributes and their levels in the choice sets were framed to closely represent the emergency care in NHS England. However, the way the attributes were framed could have influenced the choices made by respondents,[50-52] and it is unclear whether choices would remain the same, if the attributes were framed in the other way, e.g. would preferences have been different if “risk of dying” was framed as “chance of survival”? The presentation of attribute levels only in text formats could have created difficulties for some respondents in understanding the choice sets. Graphics and icons are often superior to text in communicating health information.[53-55] However it has been argued that within a DCE context, independent of educational level and literacy of respondents, words depicting attribute levels lead to more consistent answer patterns and more accurate attribute level interpretation and estimates.[51] The conventional practice of a DCE assumes that respondents choose among alternatives by rationally trading-off across all attributes in their choice set. However emerging evidence suggests that some respondents’ trade-off only a subset of attributes while choosing among alternatives.[56-58] Failing to account for this phenomenon, widely referred to as attribute non-attendance, may lead to biased preference estimates.[59] A number of methods have been

proposed in the literature to identify attribute non-attendance, which should be considered by future studies, such as asking respondents directly if they ignored any of the characteristics, use of econometric models such as latent class model to establish the probability of attribute non-attendance and use of eye-tracking technology.[59-61] Finally, the study may not be generalised to other settings, because pre-existing local influences on experiences and views will vary, such as historical service performance, demographic mix and healthcare geography.

CONCLUSION

This study explored and quantified the strength of individual preferences relating to provision of emergency medical services. The findings highlight that respondents prefer shorter travel time, shorter waiting time, fewer number of days in hospital, low risk of death, low risk of readmission and outpatient follow-up at their local hospital. However, people are willing to trade-off increased travel time and waiting time for high quality emergency medical care in a centralised hospital, in line with policy documents recommending centralisation.[3,4] Decisions to centralise emergency medical services should not only be justified on clinical grounds and cost savings, but also need to be informed by preferences of potential service users.

Figure 1. Example of choice sets used in the DCE

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Author contribution:

All authors conceived the study. NB designed the DCE, implemented the survey, carried out the analyses and wrote the first draft of the manuscript. All authors reviewed, commented, edited the manuscript and approved the final version of the manuscript.

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Suppose you have an emergency healthcare need which required calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

Characteristics	Hospital A	Hospital B
Travel time to hospital	1 and half hours	1 hour
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	4 hours or more	Less than 30 minutes
Length of stay at the hospital before going home	3 days	5 days
Risk of dying from the illness (..patients die)	Moderate (5 in 100 patients)	Mild (3 in 100 patients)
Risk of being re-admitted to the hospital after going home	Mild (3 in 100 patients)	Moderate (5 in 100 patients)
Outpatient care after emergency treatment	At a hospital which about an extra 1 hour travel time from local hospital	Local hospital
Which hospital would you chose to go in emergency? (Please tick only one box at the right)	☐	☐

Figure 1. Example of choice sets used in the DCE

108x60mm (300 x 300 DPI)

Transitivity and Monotonicity

Transitivity implies if A is preferred to B and B is preferred to C, then A should be preferred to C.[1] In each of the blocks of questionnaire, choice set number 3 with alternatives as hospital A and hospital B (i.e. from the choice design) was taken as a base for the transitivity test. The questions used for the transitivity test were spread out evenly as possible across the choice task. Therefore, another choice set number 6 was manually added (to the choice design) keeping hospital B attribute levels the same as in the choice set 3 but with a new alternative, hospital C with completely different attribute levels. Another additional choice set number 9 was manually added taking characteristics of hospital A from the choice set 3 and characteristics of hospital C from choice set 6. In short, the transitivity test was structured as follows:

Choice set number 3: Hospital A=A, Hospital B=B

Choice set number 6: Hospital A=B, Hospital B=C

Choice set number 9: Hospital A=A, Hospital B=C

However, in the questionnaire in each of the choice sets the alternatives were named as hospital A and hospital B. So, if the respondent made choices in a cyclic order (prefer A to B and prefer B to C and prefer C to A; prefer B to A, C to B, and then prefer A to C), the choice was considered intransitive and thus irrational.

Though not essential for rationality, monotonicity, is a desirable axiom of consumer theory and implies that more is preferred to less.[2] Therefore, another choice set number 12 where one hospital alternative was obviously dominant in terms of all attributes was manually added (to the choice design). It was assumed that individuals preferred the alternative with shorter travel time, shorter waiting time, low risk of mortality, low risk of readmission, shorter length of stay and outpatient follow-up at their local hospital. Any violation of monotonicity axiom in the respondent choices was considered irrational.

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Table S1. Regression results after recoding selected variables as categorical

Attributes	MNL (Main effects)	MIXL (Main effects)		GMNL (Main effects)	
	Coefficients (SE)	Coefficients (SE)	SD (SE)	Coefficients (SE)	SD (SE)
Travel Time	-0.0065 (0.0009)***	-0.0094 (0.0020)***	0.0160 (0.0026)***	-0.0105 (0.0022)***	0.0165(0.0026)***
Waiting Time	-0.0039 (0.0007)***	-0.0051 (0.0010)***	0.0046 (0.0010)***	-0.006 (0.0013)***	0.0049 (0.0010)***
Length of Stay	-0.0277 (0.0168)	-0.0608 (0.0265)*	0.1459 (0.0429)***	-0.0744 (0.0302)*	0.1541 (0.0419)***
Risk of Death					
(Base level: Low (1 in 100))					
Mild (3 in 100)	-0.6103 (0.319)	-0.3169 (0.4903)	0.2563 (0.6952)	-0.6024 (0.5483)	0.2919 (0.3664)
Moderate (5 in 100)	-1.8155 (0.288)***	-2.0607 (0.4388)***	0.3318 (0.5390)	-2.4479 (0.5104)***	0.0473 (0.4896)
High (7 in 100)	-1.5249 (0.161)***	-2.1425 (0.2830)***	1.3199 (0.2785)***	-2.4847 (0.3624)***	1.3312 (0.2726)***
Risk of Readmission					
(Base level: Low (1 in 100))					
Mild (3 in 100)	0.3326 (0.1296)*	0.3297 (0.1864)	0.3266 (0.6027)	0.4436 (0.2119)*	0.5174 (0.2913)
Moderate (5 in 100)^	-	-	-	-	-
High (7 in 100)	-0.7728 (0.1219)***	-0.9753 (0.1986)***	0.7813 (0.2846)**	-1.1345 (0.2297)***	0.8667 (0.2689)***
Outpatient Follow-Up					
(Base level: Local hospital)					
Distant hospital	-0.8455 (0.1027)***	-1.0647 (0.1808)***	0.9440 (0.1821)***	-1.2177 (0.2222)***	1.0642 (0.1940)***
Sample size (Observations)	148(2960)	148(2960)	-	148 (2960)	-
Log Likelihood	-796	-751	-	-747	-
AIC	1612	1539	-	1533	-
BIC	1680	1640	-	1647	-

**p<0.001, **p<0.01, *p<0.05; SE=Standard Error, SD= Standard Deviation; AIC= Akaike information criterion; BIC = Bayesian information criterion, ^ could not be estimated because of collinearity issues

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Preferences for centralised emergency medical services: a discrete choice experiment

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Title: Preferences for centralised emergency medical services: a discrete choice experiment

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ABSTRACT

Objectives

It is desirable that public preferences are established and incorporated in emergency healthcare reforms. The aim of this study was to investigate preferences for local versus centralised provision of all emergency medical services (EMS) and explore what individuals think are important considerations for EMS delivery.

Design

A discrete choice experiment was conducted. The attributes used in the choice scenarios were: travel time to the hospital, waiting time to be seen, length of stay in the hospital, risks of dying, readmission, and opportunity for outpatient care after emergency treatment at a local hospital.

Setting

North East England

Participants

Participants were a randomly sampled general population, aged 16 years or above recruited from Healthwatch Northumberland network database of lay members and from clinical contact with Northumbria Health Care NHS Foundation Trust via Patient Experience Team.

Primary and Secondary Outcome measures

Analysis used logistic regression modelling techniques to determine the preference of each attribute. Marginal rates of substitution between attributes were estimated to understand the trade-offs individuals were willing to make.

Results

Responses were obtained from 148 people (62 completed a web and 86 a postal version). Respondents preferred shorter travel time to hospital, shorter waiting time, fewer number of days in hospital, low risk of death, low risk of readmission and outpatient-follow up care in their local hospital. However, individuals were willing to trade-off increased travel time and waiting time for high quality centralised care. Individuals were willing to travel nine minutes more for a one day reduction in length of stay in the hospital, 38 minutes for a 1% reduction in risk of death and 112 minutes for having outpatient follow-up care at their local hospital.

Conclusions

People value centralised EMS if it provides higher quality care and are willing to travel further and wait longer.

Strengths and limitations of this study

- The findings of this study might inform decision makers redesigning emergency medical services about preferences of potential users of that service.
- Participants were randomly sampled from specific population groups registered with Healthwatch or Northumbria Healthcare NHS Foundation Trust, and therefore may not represent the general population.
- The attributes used in the DCE and their levels were framed to closely represent emergency care in NHS England, however some other important attributes may have been left out.

BACKGROUND

The National Health Services (NHS) in the United Kingdom (UK) faces growing service demands and costs which threaten its sustainability and financial stability.[1] A radical and transformative change is essential for the NHS to maintain safety and quality, but this may reduce immediate access to care for some patients. Increased funding could be a part of the solution but the NHS budget is limited. While all areas of healthcare face challenges and major changes in service provision, those faced by acute hospitals are significant because outcomes can depend upon time-critical treatments, demand is rising annually and they are supported by a major proportion of the healthcare budget.[2]

In the UK, consolidation of specialised medical care is one of the service models envisaged by the NHS "Five year forward view".[3] It is recommended that emergency care be reconfigured into larger specialised emergency units providing earlier multidisciplinary expertise and associated facilities.[4] Whilst there exists some condition specific evidence that centralisation of specialist services yields better clinical outcomes and savings,[5-7] there are arguments against centralisation in term of poorer access, increased travel time and costs, as well as preferences expressed by patients and the public around the provision of local services.[8-12]

Understanding public preferences about the location and nature of healthcare providers has become an important influence upon policy and many European countries have incorporated this information into decisions about the organisation of their healthcare systems.[13] Incorporating patient views in healthcare policy decisions may improve the uptake and efficiency of services. Including patient/public views may also lead to better quality research on treatments and service provision. However, little is known about preferences for the centralisation of emergency medical services.

The aim of this study was to examine public preferences for the different attributes of centralised emergency medical services in England, reported using trade-offs between attributes which reflect the key consequences.

METHODS

A discrete choice experiment (DCE) was used to explore preferences. DCEs provide rich data sources for economic evaluation and decision-making and offer several other advantages compared to other stated preference elicitation methods.[14,15] DCEs involve presenting individuals with a series of hypothetical choices which differ in attributes (characteristics) and their magnitude or levels, and ask them to choose the alternative they prefer in each set. The choices that individuals make from a DCE survey enable researchers to understand the value that individuals place on various levels of healthcare provision attributes. A DCE also allows quantification of the relative importance of attributes in terms of willingness to pay and marginal rates of substitution.[16]

Attributes and level

The attributes associated with centralisation were identified from literature[17-21] and also reflected the key performance measures commonly used in emergency medical services[22] and key quality indicators in NHS England (Table 1).[10,23,24] A long list of attributes and their levels were identified from the literature, but the list was shortened based on their relative importance in our study and for the NHS. After discussions within the research team which also consisted of an experienced senior clinician working in emergency medicine, the identified attributes were assigned discrete levels that were likely to be applicable within the UK NHS and closely reflected the reality.[25] The design was kept as simple as possible so that respondents can make a trade-off easily.

Table 1. Attributes and levels used in the DCE

Attributes	Levels
Travel time to hospital	< 30 min,1 hour,1 and half hours,2 hours or more
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	30 min,1 hour,2 and half hours,4 hours or more
Length of stay at the hospital before going home	1 day or less, 3 days, 5 days, 6 days or more
Risk of dying from the illness	Low (Less than 1 in 100 patients), Mild (3 in 100 patients), Moderate (5 in 100 patients), High (More than 7 in 100 patients)
Risk of being re-admitted to the hospital after going home	Low (Less than 1 in 100 patients), Mild (3 in 100 patients), Moderate (5 in 100 patients), High (More than 7 in 100 patients)
Outpatient care after emergency treatment	At your Local hospital, At a hospital which is about an extra 1 hour travel time from your local hospital

Questionnaire design

A full factorial design incorporating all possible combinations of attributes and levels would have resulted in 2048 (i.e. 4^5X2^1) possible scenarios. Therefore, an efficient design, which maximises the statistical efficiency of designs by minimizing the predicted standard errors of the parameter estimates (usually the D-error statistic) was used.[26] An efficient fractional factorial design[26,27] still generated 20 choice sets. To minimise the potential cognitive burden to the respondents, the choice sets were blocked into two, with each block having 10 choice sets (see Figure 1 for a choice set example). The generation of efficient design requires a priori knowledge of attributes used in the choice model.[28] The prior[28] estimates of attribute coefficients used in the final efficient design were derived from a pilot survey (see below). A further three choice sets were added to each block as tests of transitivity[29,30] and monotonicity[29]- which are tests of theoretical validity and

rationality of choice sets used in the DCE. Theoretical validity and rationality checks assessed whether the parameters moved in the expected direction. For example, it was expected that shorter travel time to a hospital is preferred over longer travel time duration. Further details on transitivity and monotonicity tests used are in the supplementary file.

Altogether, the final design included 13 choice sets in each of the two blocks of DCE choice sets, which were randomly allocated to participants. Choice sets were defined as efficient design using Ngene software version 1.1.1.[31]

The questionnaire also included questions on socio-demographic information such as gender, age-group, and generic health information. Also included was a question asking the respondents how difficult the DCE task was for them. The respondents were asked to make a forced choice between two alternative hospitals; an opt-out alternative of “no treatment” in a healthcare emergency lacked realism. The questionnaire used in the survey are in supplementary file.

Pretesting and piloting

The understanding of the attributes and levels was pre-tested in-house among members of the Institute of Health & Society, Newcastle University and piloted on a small non-random sample of potential participants (n=26). Following the pre-test and pilot, the wording and display of the survey introduction and the choice sets were revised and simplified. The attribute coefficients generated from the pilot were used as priors to generate the final questionnaire design as described earlier. The priors generated from the pilot are presented in the supplementary file: Table S1.

Sample

The survey sample was recruited from the general public over 16 years of age either registered with Healthwatch Northumberland network database of lay members or with clinical contact with Northumbria Healthcare NHS Foundation Trust and accessed via the Patient Experience Team. Participants were approached between January-April 2016. The sample represented a general population whose EMS had recently been centralised. Grounded on the recommendations to centralise EMS[3,4], a new specialised emergency care hospital was built at Cramlington in Northumberland, the first of its kind in the UK, with the aim to provide improved quality of care by providing faster access to consultants and diagnostics.[10] Before June 2015, the emergency medical services were provided from the A&E departments at three general hospitals within the area: North Tyneside, Wansbeck and Hexham. All of these hospitals are operated by Northumbria Healthcare NHS Foundation Trust and they accounted for 90% of all A&E visits by the population of Northumberland[10]. The emergency care provided by the three general hospitals was centralised into the new specialised hospital.

Sample size estimation methods in healthcare DCE studies are currently developing[32]. Therefore, the sample required for this study was estimated following the rule of thumb suggested by Johnson and Orme[32-34] using the equation $N>500L/TA$ where L is the largest number of levels for any of the choice attributes, T is the number of choice sets and A is the number of alternatives assessed. The required minimum sample was estimated as 100 respondents. However, much larger sample was targeted to allow for heterogeneity between respondents.

Data were collected using postal questionnaires and online. Potential respondents with an email address registered were sent an electronic link to the survey hosted by an online commercial platform, Qualtrics (www.qualtrics.com). Whereas those without email access were sent a paper-copy of the survey. Participants previously identified with visual impairments were sent a paper format of the questionnaire in large font size. The invitation to complete the survey questionnaire

explained a description of each of the characteristics used, and how the responses would be used. A clear statement of voluntary participation was included.

Data analysis

The survey data analysis was based on the random utility framework- the underlying theory that underpins the DCEs.[35] It has been argued that failure of a validity test would not necessarily mean the respondent was irrational and deletion of responses that fail the validity tests may result in removal of valid preferences which may lead to biased results.[29] Moreover, random utility theory is expected to be robust to such violations in validity tests.[29] Furthermore, qualitative research in this area[36,37] also revealed that respondents failing the validity tests had rational reasons for doing so. Therefore, all respondents regardless of failing the validity tests were included in the final analysis.

A range of logistic regression modelling approaches were used. Multinomial logit (MNL) (also known as conditional logit analyses), mixed multinomial logit (MIXL) and generalised multinomial logit (GMNL) models were fitted to estimate changes in the preference or utility of each attribute.[38] MNL assumed homogenous choice across the respondent sample and also assessed the significance of attribute interactions with respondent characteristics. However, the MNL models are based on assumptions of independence of irrelevant alternatives (IIA), independence and identical distribution of error terms (IID) across observations and no heterogeneity across respondents. This may be restrictive and limited in describing human choice behaviour.[38] Therefore the MIXL model,[39,40] a popular extension of the MNL model was also used, which while keeping the IID and not making the IIA assumptions eliminates the limitations of MNL and allowed for choice heterogeneity across respondents. It has been argued that GMNL model allows for the scale heterogeneity by accounting for some respondents who exhibit more random (i.e. relatively insensitive to attributes) and extreme choices (i.e. near lexicographic-always choosing a particular attribute regardless of others), and thus

offers a better fit; outperforming the MIXL model.[41] Therefore, GMNL model was also used in the analysis. A constant term was not included. Akaike information criterion (AIC) and Bayesian information criterion (BIC) were used as measures of the model fit. The lower the AIC and BIC measures the more preferred is the model.[42]

Marginal rates of substitution (MRS) were calculated, across all models (to account for the models limitations described earlier), to compare respondent preferences on a common value scale and understand the trade-offs made between two-attributes. MRS values were computed using travel time to hospital and time waiting to be seen to present the preferences, so that the trade-offs could be compared in terms of willingness to travel and willingness to wait. All analyses were undertaken using R statistical programme version 3.2.4.[43]

Patient and public involvement

No patient or public were involved in the design, conduct and reporting of this research. Nevertheless, the priors generated from a pilot study conducted in a sample of general population informed the design of the DCE survey.

Ethics approval

Ethics approval for the DCE survey was provided by Newcastle University Faculty of Medical Sciences Ethics Committee (approval code 00893/2015). Specific written consent was not obtained from participants, but they were made aware that the participation in the survey was voluntary and returning a completed questionnaire was an indication of consent. No personal identifiable information was collected and all data from participants were anonymous. The survey data and other related materials were handled in accordance with the Newcastle University's rules and regulations in place with strict adherence to *The Data Protection Act 1998,* the law in force at the time of the

survey, and the *Newcastle University Information Security Guidelines* (http://www.ncl.ac.uk/data.protection/policy.htm).

RESULTS

In total, 148 respondents completed the survey: 62 online and 86 on paper. Whilst the response rate in the survey sent by post was 13%, it was not possible to assess the response rates in the web version of the survey as we could not verify how many had received the link. However, the web-link was opened on 101 occasions and the response rates in terms of those opening the web version was about 61%. Among the respondents, 44% reported (answered the survey question on difficulty in completing the DCE) some form of difficulty in completing the choice sets.

Respondent characteristics

Among the 148 respondents, there were almost twice the number of females compared to males (Table 2). Most respondents aged more than 55 years of age. About half of the respondents had some form of emergency experience in the immediate 12 months before the survey. The health related quality of life (EQ-VAS=75.5, EQ-5D-5L=0.77) is similar to that estimated for the UK general population above 55 years of age (which is EQ-VAS=77.6; EQ-5D=0.77).[44]

Table 2. Summary of respondent characteristics

Characteristics	All
Sample (n)	148
Age groups	
16-29	4 (2.7%)
30-34	6 (4.0%)
35-39	5 (3.4%)
40-44	4 (2.7%)
45-49	9 (6.1%)
50-54	12 (8.1%)
55-59	19 (12.8%)
60-64	21 (14.2%)
65-69	27 (18.0%)
70-74	17 (11.5%)
75-79	9 (6.1%)
80-84	9 (6.1%)
85+	6 (4.0%)
Gender	
Male	49 (33.1%)
Female	98 (66.2%)
Prefer not to reveal	1 (0.7%)
Health related quality of life	
Mean EQ-VAS score (SD)	75.50 (20.5)
Mean EQ-5D-5L score(SD)	0.77 (0.2)
Emergency experience	
Yes	78 (52. 7 %)
No	70 (47.3%)

Regression analysis of the DCE data

Two respondents failed the validity tests. However, an initial regression analysis indicated that the coefficient estimates remained similar regardless of whether those respondents failing the validity tests were included or excluded in the analysis. Therefore, the results on these studies are based on analysis of data from all respondents regardless of failing the validity tests.

Table 3 presents the regression analysis when all the attributes are taken to be continuous. In the "travel time" and "waiting time" attributes where the levels had "less than" or "more than" categories, only the number of minutes were used, for example 30 minutes for "less than 30 minutes". The outpatient follow up was coded as "0" for local hospital and "1" for a distant hospital. The negative

and positive signs in the coefficients indicate preference of a lower level and higher level of an attribute respectively. The coefficient estimates were in line with expectations that individuals would prefer shorter travel time to the hospital, shorter waiting time to receive the service, fewer number of days of length of stay in the hospital, low risk of death, low risk of readmission and outpatient follow-up care after the emergency treatment in their local hospital.

Table 3. Regression results

Attributes	MNL (Main effects)	MNL (Including respondent characteristics)	MIXL (Main effects)		GMNL (Main effects)	
	Coefficients (SE)	Coefficients (SE)	Coefficients (SE)	SD (SE)	Coefficients (SE)	SD (SE)
Travel Time	-0.0086 (0.0009)***	-0.00068 (0.0032)	-0.0125 (0.0020)***	0.0165(0.0024)***	-0.0235 (0.0097)*	0.0254 (0.0091)**
Waiting Time	-0.0056 (0.0005)***	-0.00333(0.0015)*	-0.0077 (0.0008)***	0.0048(0.0009)***	-0.0146 (0.0059)*	0.0078 (0.0028)**
Length of Stay	-0.0768 (0.0152)***	-0.0784(0.0153)***	-0.1217 (0.0262)***	0.1608(0.0395)***	-0.2501 (0.1149)*	0.2668 (0.1264)*
Risk of Death	-0.3258 (0.0202)***	-0.1953(0.0553)***	-0.4623 (0.0425)***	0.2577(0.0434)***	-0.8409 (0.3184)**	0.3930 (0.1478)**
Risk of Readmission	-0.1442 (0.0159)***	-0.0192 (0.0518)	-0.1803 (0.0262)***	0.1384(0.0386)***	-0.3436 (0.1491)*	0.2210 (0.1171)
Outpatient Follow-Up	-0.9624 (0.0776)***	-0.9887(0.0792)***	-1.2442 (0.1424)***	0.7290(0.1826)***	-2.2214 (0.8883)*	1.5190 (0.1478)*
Interaction terms						
Travel Time*Gender	-	-0.0049 (0.0019)**	-	-	-	-
Waiting Time*Gender	-	-0.0021 (0.0009)*	-	-	-	-
Waiting Time*Survey Mode	-	0.0027 (0.0008)***	-	-	-	-
Risk of Death*Gender	-	-0.1047 (0.0327)**	-	-	-	-
Risk of Death*Survey Mode	-	0.0862 (0.0291)**	-	-	-	-
Risk of Readmission*Gender	-	-0.0775(0.0297)**	-	-	-	--
Sample size (Observations)	148(2960)	148(2960)	148(2960)	-	148 (2960)	-
Log Likelihood	-813	-800	-763	-	-757	-
AIC	1640	1623	1522	--	1544	-
BIC	1670	1687	1621	-	1624	-

***p<0.001, **p<0.01, *p<0.05; SE=Standard Error, SD= Standard Deviation; AIC= Akaike information criterion; BIC = Bayesian information criterion; Survey Mode refers to paper vs web based

Table 3 also assessed the significance of attribute interactions with respondent characteristics. None of the attribute interactions with respondent age and self-reported health measures were significant which ruled out important differences in preferences of emergency healthcare because of age and health status. Only interactions (Travel Time* Gender, Waiting Time * Gender, Waiting Time* Survey Mode, Risk of Death* Gender, Risk of Death* Survey Mode, Risk of Readmission*Gender) were significant and these were considered in the final specification (Table 3). Results suggest that men have stronger preferences for shorter travel time (-0.0049, $p<0.01$), shorter waiting time (-0.0021, $p<0.05$), lower risk of death (-0.1047, $P<0.01$) and lower risk of readmission (-0.00775, $P<0.01$) compared to women. Respondents completing the web-based survey showed stronger preferences for less waiting time (0.0027, $p<0.001$) and lower risk of death (0.0862, $p<0.01$) compared to those completing the survey in paper. In the MIXL model, the significance of attributes remained the same as in MNL model, however, lower AIC and BIC in the MIXL indicated that it provided a better model fit compared to MNL model. Furthermore, the MIXL model identified heterogeneity among respondents (shown by the statistically significant standard deviations). This suggested that MIXL was more appropriate that the MNL model. In the GMNL model, the coefficient estimates retained the signs and significance similar to MNL and MIXL.

Table S2 (In supplementary file) reported the analysis when risk of readmission", risk of death and outpatient follow-up were treated as categorical variables as opposed to continuous variables as they were in Table 3. Categorical data were expressed as dummy variables. There was no evidence of any difference in preferences for the different levels of "length of stay" in the MNL model. Furthermore, in all three of the statistical models (MNL, MIXL, GMNL), there was no evidence that preferences for the mild of "risk of death" were any different to the reference category (low risk of death (1 in 100)) across all three models. The magnitude of the coefficients increased in line with the increase in the levels of "risk of readmission" and "outpatient follow-up", however coefficients for increasing levels of "risk of readmission" did not increase in a linear manner and there was no evidence that the mild "risk of readmission" was preferred to low risk of readmission.

Marginal rates of substitution

The coefficients generated from each of the different regression models in Table 3 were used to calculate the marginal rates of substitution (MRS) in Table 4. The MRS in Model 1A indicated that participants were willing to travel nine minutes more and willing to wait 14 minutes more for a one day reduction in length of stay in the hospital. The willingness to travel increased to 38 minutes and the willingness to wait increased to 58 minutes for one percent reduction in risk of death in hospital. The willingness to travel was 112 minutes and willingness to wait was 172 minutes for having outpatient follow-up care after the emergency treatment at their local hospital. In Model 1B the coefficients of travel time and risk of readmission used to generate the MRS were not significant, therefore the marginal willingness to travel across all attributes and marginal willingness to wait derived for the attribute risk of readmission were not significant. Nevertheless, the MRS estimates in all the models (except Model 1B) were generally similar.

Table 4. Marginal rates of substitution in terms of willingness to travel and willingness to wait

Attributes	Marginal rates of substitution								Condition
	MWT (in minutes)				**MWW** (in minutes)				
	Model 1A	**Model 1B**	**Model 1C**	**Model 1D**	**Model 1A**	**Model 1B**	**Model 1C**	**Model 1D**	
Length of stay	8.93	115.29	9.74	10.64	13.71	23.54	15.81	17.13	For 1 day reduction in length of stay in hospital
Risk of Death	37.88	287.21	36.98	35.78	58.18	58.65	60.04	57.6	For 1% reduction in risk of death in hospital
Risk of Readmission	16.76	28.24	14.42	14.62	25.75	5.77	23.42	23.53	For 1% reduction in risk of readmission in hospital
Outpatient Follow-Up	111.90	1453.97	99.54	94.53	171.85	296.91	161.58	152.2	For having outpatient follow- up care at their local hospital

MWT- Marginal willingness to travel; MWW- Marginal willingness to wait; Model 1A- Main effects MNL, Model 1B- With interactions MNL, Model 1C- Main effects MIXL, Model 1D- Main effects GMNL

DISCUSSION

Summary of the findings

This examination of public preferences demonstrated the influence of attributes on the choice of hospitals in an emergency healthcare situation. In general, participants preferred shorter travel times, shorter waiting times, fewer number of days in hospital, low risk of death, low risk of readmission and local outpatient follow-up. Gender influenced the strength of the preference, with results suggesting that men have stronger preferences for shorter travel time, shorter waiting time, lower risk of death and lower risk of readmission compared to women. However, there was no evidence of influence of other characteristics such as age, recent experience of emergency care and current health state of the individual.

The results indicate that if centralisation of emergency medical services increases travel and waiting times, but offered better care in terms of reduced risk of death, reduced length of stay, reduced risk of readmission and provisions for follow-up care in the local hospital, then participants would prefer the centralised service. Travelling 38 minutes longer by ambulance and waiting about an hour more for 1% reduction in risk of dying seems reasonable. The participants valued the opportunity for follow-up at their local hospital more than any other attributes examined in this DCE. Though traveling about 2 hours longer and waiting about 3 hours more may appear unrealistic value placed on local outpatient follow-up, these possibly reflect the feeling of emotional attachment and enormous pride of people towards their local NHS hospital.[45] However, it was also found that the centralised hospital should also not be too far away to be acceptable (not needing more than two hours of additional travel time).

Comparison with other studies

While differences exist between studies in terms of healthcare context, design, attributes and levels used, the findings of this study are in line with other relevant DCE studies. Earlier studies attempting to quantify the strengths of individual preferences for unscheduled healthcare available during usual GP service hours have indicated that patients prefer shorter waiting times to get a decision on treatment and that services are provided closer to their homes.[20,46] Unlike our study, these studies reported age related differences in strength of preferences: younger age groups (<45 years) held strong preferences with respect to the way of making contact with the healthcare system. A study on Australian public's choice among alternatives of emergency care reported clear preferences for shorter waiting times and strong emphasis on the quality of emergency healthcare service.[47] A significant preference heterogeneity was observed in this study and the strength of the preference changed according to the presenting context and situation such as the perceived severity of illness and who was being treated, but the influence of age and gender was not reported. Another DCE study which examined the factors influencing the choice of hospitals in London patients on waiting lists of range of non-emergency situations demonstrated that individuals prefer shorter travel time to hospital, shorter waiting time to receive the service, the follow-up care at their home hospital and a high valuation of hospital reputation.[19] This study reported differences in preferences in patient related to gender and age suggesting that patients are more likely to prefer stay at their local hospitals as their age increases and males are more likely to choose to move to a non-local alternative hospital than females. Potential patients in Germany were willing to sacrifice longer travel distance and preferred location of care for a highly specialised surgical care provision with shorter waiting times,[48] but the influence of respondent age and gender was not reported.

It is not surprising that non-emergency situations show similar results. A recent study assessing preferences for centralising specialist cancer services also found that patients,

health professionals and the public all prefer shorter travel times, lower risk of death and complications, and better access to specialist centres.[49] However, there was no evidence of differences because of gender, age or place of residence of the respondents. Risk of death and risk of complications were ranked highly whereas relatively lower importance was given to travel time.

Implications of the study findings

This study reveals preferences and the trade-offs individuals are willing to make across hospital attributes when choosing hospitals for emergency healthcare. The findings provide valuable insights for decision-makers in relation to the centralisation of emergency healthcare services. Contrary to the concerns about distance decay,[11,12] where the utilisation of healthcare services decreases with the increase in travel time to healthcare facilities, the findings suggest that whilst people may place a high value on their local hospital, in an emergency situation they may be willing to exchange increased journey time for better quality of care. This assumes that the ambulance response would be the same, and that other aspects of local services would not be affected, which may not be realistic but exploring this with the DCE would have added additional complexity that may make the tool difficult to complete. However, healthcare centralisation planners should also carefully consider how best to work with town and traffic planning services to help optimalise services or at the very least ensure that other system constraints do not remove any potential benefits of centralisation. The preferences are not influenced by age, health status or previous experience of emergency medical services, suggesting that services do not necessarily have to be tailored according to age-groups or health status, at least within the range of respondents studied. However, it was observed that there are gender differences in the strength of the preferences, which could possibly be related to the differences in knowledge, attitudes and previous healthcare experiences between men and women.[50] Whilst this finding may specifically reflect this cohort, it is recommended that future researchers and healthcare providers

consider any communication about centralising services should be sensitive to gender differences whilst not allowing decisions about service provision to be driven by the preferences one particular gender especially without clearly understanding why these differences exist. Overall, the DCE results support policy recommendations to centralise emergency medical care in local hospitals into fewer specialised high performing units,[3,4] as long as journey times are not excessively long and after-care can be provided locally. However, our survey was framed to look at choices for emergency ambulance admissions and we caution that these findings may not reflect the preferences in "blue-light" emergencies where the patient is not in a position to make the choice of which hospital to go to. Nevertheless, the preferences observed are for planning services and not for making decision about immediate care in an emergency.

Strengths and limitations

The findings of this study should be interpreted in light of some strengths and limitations. We attempted to study a wide cross section of a local unselected population to represent the preferences of potential users for a newly built centralised emergency hospital. However, due to the contact databases which were available for us to invite participants, it only represents specific population groups registered with the Healthwatch or Northumbria Healthcare NHS Foundation Trust, and sampling bias cannot be ruled out. Whilst DCE offers several advantages over other preference elicitation methods used in healthcare, concerns have been expressed about their external validity.[51] Despite a high proportion of complete responses in the DCE, a number of participants found the choice tasks difficult to complete which could mean the attributes were not appropriate to them and the choices were arbitrarily made. Furthermore, the attributes used in the DCE were taken from the literature solely and were not based on findings from qualitative research[52], nor was the choice of attributes and levels informed by any patient and public involvement (PPI). Consequently, other important attributes may have been left out. The attributes and their levels in the choice sets were framed to closely

represent the emergency care in NHS England. However, the way the attributes were framed could possibly have influenced the choices made by respondents,[53-55] and it is unclear whether choices would remain the same, if the attributes were framed in the other way, e.g. would preferences have been different if “risk of dying” was framed as “chance of survival”? or if “travel time” and “waiting time” were used as a single attribute of “call to treatment time”? But, merging the “travel time” and “waiting time” as a single attribute at the design stage would have reduced the explanatory power of the DCE. The presentation of attribute levels only in text formats could have created difficulties for some respondents in understanding the choice sets. Graphics and icons are often superior to text in communicating health information.[56-58] However it has been argued that within a DCE context, independent of educational level and literacy of respondents, words depicting attribute levels lead to more consistent answer patterns and more accurate attribute level interpretation and estimates.[54] One of the strengths of this survey lies in the fact that both survey modes- web based and postal (paper) were used enabling us to increase the representation of a wider cross section of population. However, experimenting with the different approaches for survey administration was beyond the scope of this study, use of different approaches might have introduced a response bias because of the systematic differences (for example proportion of older people) between the respondents in each approach. The conventional practice of a DCE assumes that respondents choose among alternatives by rationally trading-off across all attributes in their choice set. However emerging evidence suggests that some respondents’ trade-off only a subset of attributes while choosing among alternatives.[59-61] Failing to account for this phenomenon, widely referred to as attribute non-attendance, may lead to biased preference estimates.[62] A number of methods have been proposed in the literature to identify attribute non-attendance, which should be considered by future studies, such as asking respondents directly if they ignored any of the characteristics, use of econometric models such as latent class model to establish the probability of attribute non-attendance and use of eye-tracking technology.[62-64] Finally, the study may not be generalised to other settings, because pre-existing local

influences on experiences and views will vary, such as historical service performance, demographic mix and healthcare geography.

CONCLUSION

This study explored and quantified the strength of individual preferences relating to provision of emergency medical services. The findings highlight that respondents prefer shorter travel time, shorter waiting time, fewer number of days in hospital, low risk of death, low risk of readmission and outpatient follow-up at their local hospital. However, people are willing to trade-off increased travel time and waiting time for high quality emergency medical care in a centralised hospital, in line with policy documents recommending centralisation.[3,4] Decisions to centralise emergency medical services should not only be justified on clinical grounds and cost savings, but also need to be informed by preferences of potential service users.

Figure 1. Example of choice sets used in the DCE

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Author contribution:

NB, PM, CP and LV conceived the study. NB designed the DCE, implemented the survey, carried out the analyses and wrote the first draft of the manuscript. NB, PM, CP and LV reviewed, commented, edited the manuscript and approved the final version of the manuscript.

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Suppose you have an emergency healthcare need which required calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

Characteristics	Hospital A	Hospital B
Travel time to hospital	1 and half hours	1 hour
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	4 hours or more	Less than 30 minutes
Length of stay at the hospital before going home	3 days	5 days
Risk of dying from the illness (..patients die)	Moderate (5 in 100 patients)	Mild (3 in 100 patients)
Risk of being re-admitted to the hospital after going home	Mild (3 in 100 patients)	Moderate (5 in 100 patients)
Outpatient care after emergency treatment	At a hospital which about an extra 1 hour travel time from local hospital	Local hospital
Which hospital would you chose to go in emergency? (Please tick only one box at the right)	☐	☐

210x297mm (300 x 300 DPI)

Transitivity and Monotonicity

Transitivity implies if A is preferred to B and B is preferred to C, then A should be preferred to C.[1] In each of the blocks of questionnaire, choice set number 3 with alternatives as hospital A and hospital B (i.e. from the choice design) was taken as a base for the transitivity test. The questions used for the transitivity test were spread out evenly as possible across the choice task. Therefore, another choice set number 6 was manually added (to the choice design) keeping hospital B attribute levels the same as in the choice set 3 but with a new alternative, hospital C with completely different attribute levels. Another additional choice set number 9 was manually added taking characteristics of hospital A from the choice set 3 and characteristics of hospital C from choice set 6. In short, the transitivity test was structured as follows:

Choice set number 3: Hospital A=A, Hospital B=B

Choice set number 6: Hospital A=B, Hospital B=C

Choice set number 9: Hospital A=A, Hospital B=C

However, in the questionnaire in each of the choice sets the alternatives were named as hospital A and hospital B. So, if the respondent made choices in a cyclic order (prefer A to B and prefer B to C and prefer C to A; prefer B to A, C to B, and then prefer A to C), the choice was considered intransitive and thus irrational.

Though not essential for rationality, monotonicity, is a desirable axiom of consumer theory and implies that more is preferred to less.[2] Therefore, another choice set number 12 where one hospital alternative was obviously dominant in terms of all attributes was manually added (to the choice design). It was assumed that individuals preferred the alternative with shorter travel time, shorter waiting time, low risk of mortality, low risk of readmission, shorter length of stay and outpatient follow-up at their local hospital. Any violation of monotonicity axiom in the respondent choices was considered irrational.

Reference:

1. Ozdemir S, Mohamed AF, Johnson FR, et al. Who pays attention in stated-choice surveys? Health economics 2010;19:111-8.
2. Lancsar E, Louviere J. Deleting 'irrational' responses from discrete choice experiments: a case of investigating or imposing preferences? Health economics 2006;15:797-811.

Table S1: Regression results from the pilot study

Attributes	**Coefficients (SE)** (Main effects-MNL)
Travel time	-0.01 (0.003)***
Waiting time	-0.007 (0.0013)***
Length of stay	-0.10 (0.04)*
Risk of death	-0.28 (0.05)***
Risk of readmission	-0.16 (0.04)***
Outpatient follow-up	-0.62 (0.17)***

***p<0.001, *p<0.05; SE=Standard Error,

Table S2. Regression results after recoding selected variables as categorical

Attributes	MNL (Main effects)	MIXL (Main effects)		GMNL (Main effects)	
	Coefficients (SE)	Coefficients (SE)	SD (SE)	Coefficients (SE)	SD (SE)
Travel Time	-0.0065 (0.0009)***	-0.0094 (0.0020)***	0.0160 (0.0026)***	-0.0105 (0.0022)***	0.0165(0.0026)***
Waiting Time	-0.0039 (0.0007)***	-0.0051 (0.0010)***	0.0046 (0.0010)***	-0.006 (0.0013)***	0.0049 (0.0010)***
Length of Stay	-0.0277 (0.0168)	-0.0608 (0.0265)*	0.1459 (0.0429)***	-0.0744 (0.0302)*	0.1541 (0.0419)***
Risk of Death					
(Base level: Low (1 in 100))					
Mild (3 in 100)	-0.6103 (0.319)	-0.3169 (0.4903)	0.2563 (0.6952)	-0.6024 (0.5483)	0.2919 (0.3664)
Moderate (5 in 100)	-1.8155 (0.288)***	-2.0607 (0.4388)***	0.3318 (0.5390)	-2.4479 (0.5104)***	0.0473 (0.4896)
High (7 in 100)	-1.5249 (0.161)***	-2.1425 (0.2830)***	1.3199 (0.2785)***	-2.4847 (0.3624)***	1.3312 (0.2726)***
Risk of Readmission					
(Base level: Low (1 in 100))					
Mild (3 in 100)	0.3326 (0.1296)*	0.3297 (0.1864)	0.3266 (0.6027)	0.4436 (0.2119)*	0.5174 (0.2913)
Moderate (5 in 100)^	-	-	-	-	-
High (7 in 100)	-0.7728 (0.1219)***	-0.9753 (0.1986)***	0.7813 (0.2846)**	-1.1345 (0.2297)***	0.8667 (0.2689)***
Outpatient Follow-Up					
(Base level: Local hospital)					
Distant hospital	-0.8455 (0.1027)***	-1.0647 (0.1808)***	0.9440 (0.1821)***	-1.2177 (0.2222)***	1.0642 (0.1940)***
Sample size (Observations)	148(2960)	148(2960)	-	148 (2960)	-
Log Likelihood	-796	-751	-	-747	-
AIC	1612	1539	-	1533	-
BIC	1680	1640	-	1647	-

**p<0.001, **p<0.01, *p<0.05; SE=Standard Error, SD= Standard Deviation; AIC= Akaike information criterion; BIC = Bayesian information criterion, ^ could not be estimated because of collinearity issues

Survey on Hospital Preferences

(Block-1)

This survey is being carried out by a researcher in health economics at the Institute of Health & Society, Newcastle University. We would like to know what is important to you when thinking about hospitals which provide accident and emergency care. To do this we will ask you to **make a series of choices between two hospitals** which do not exist, but this will allow us to understand what people think is important when designing emergency services. We would like to know which hospital you personally would prefer to go to if you were suddenly unwell and had called 999, and whether your view would change if the hospitals performed differently e.g. reduced or increased waiting times or survival rates. We have not suggested a reason why you would be unwell, but it is not a painful condition. You would require treatment on the same day to feel better and this can only be given in hospital.

The answers you provide here will only be used for research purposes and will not directly affect the healthcare that you need. There are no right or wrong choices, we are just interested in knowing your views. **You cannot be identified from your answers**. Please do not write anything which might give away your identity.

The hospitals **differ** in terms of the following ways:

1) **Travel time to the hospital**: This is the time it takes you to reach the hospital by ambulance.
2) **Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment**: This is the time you need to wait at the A&E to be given specific treatment for your problem by a doctor or nurse.
3) **Length of stay at the hospital before going home:** This is the number of days you need to stay in this hospital.

4) **Risk of dying from the illness:** This is a comparison of the average number of persons dying because of this illness after attending hospital.
5) **Risk of being re-admitted to the hospital after going home:** This is the likelihood of being re-admitted to the hospital after you are discharged.
6) **Outpatient care after emergency treatment:** This is the hospital you need to go for outpatient care after discharge following your emergency treatment.

All other aspects of the two hospitals are the same.

Example of the task (*Please do not fill this one*)

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, Hospital A and Hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	Hospital B
Travel time to hospital	1 and half hours	1 hour
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	4 hours or more	Less than 30 minutes
Length of stay at the hospital before going home	3 days	5 days
Risk of dying from the illness	Moderate (5 in 100 patients)	Mild (3 in 100 patients)
Risk of being re-admitted to the hospital after going home	Mild (3 in 100 patients)	Moderate (5 in 100 patients)
Outpatient care after emergency treatment	At a hospital which is about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box)	☐	☐

In this example,

- It takes 1 and half hours to reach hospital A and takes 1 hour to reach hospital B.
- You need to wait 4 hours or more in the A&E to be treated in hospital A, but less than 30 minutes hospital B.
- The length of stay in Hospital A is 3 days whereas it is 5 days in Hospital B.
- Patient has moderate risks of death in Hospital A but has mild risks in Hospital B.
- The risk of being re-admitted is mild for Hospital A and is moderate for Hospital B.
- Outpatient care, after emergency treatment, at hospital B is provided at local hospital and at hospital A is provided at a hospital which is about 1 hour travel time away from the local hospital.

  Here if hospital B is chosen, the box in the Hospital B column is marked with a √ in the box. Or if hospital A is chosen, the box in the Hospital A column is marked with √**.**

In addition, we will ask you few other questions about you, but remain assured that no questions will identify who you are.

It takes about 15 minutes to complete the survey. Your participation in this survey is voluntary and you can stop at any time without providing any reason. If you do complete the survey it is not possible to remove your answers later. We cannot identify them, but nobody else will know your answers either. Should you have any queries regarding the survey you can contact the researcher on this telephone 01912087821, or email: nawaraj.bhattarai@ncl.ac.uk .

If you agree to take part in this survey, then please choose which emergency hospital you would like to go to in the following situations. **Please note that in each of the situations the characteristics of hospitals change**.

For each situation please indicate which hospital you prefer by putting a tick (√) in the appropriate box.

Scenario 1

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	Hospital B
Travel time to hospital	1 hour	1 and half hours
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	2 and half hours	1 hour
Length of stay at the hospital before going home	3 days	5 days
Risk of dying from the illness	Mild (3 in 100 patients)	Moderate (5 in 100 patients)
Risk of being re-admitted to the hospital after going home	Mild (3 in 100 patients)	Moderate (5 in 100 patients)
Outpatient care after emergency treatment	At your local hospital	At a hospital which is about an extra 1 hour travel time from your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 2

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	1 hour	1 and half hours
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	1 hour	2 and half hours
Length of stay at the hospital before going home	5 days	3 days
Risk of dying from the illness	High (7 in 100 patients)	Mild (3 in 100 patients)
Risk of being re-admitted to the hospital after going home	Moderate (5 in 100 patients)	Mild (3 in 100 patients)
Outpatient care after emergency treatment	At a hospital which is about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 3

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	2 hours or more	Less than 30 minutes
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	4 hours or more	1 hour
Length of stay at the hospital before going home	1 day or less	6 days or more
Risk of dying from the illness	Low (1 in 100 patients)	High (7 in 100 patients)
Risk of being re-admitted to the hospital after going home	High (7 in 100 patients)	Low (1 in 100 patients)
Outpatient care after emergency treatment	At your local hospital	At a hospital which about an extra 1 hour travel time from your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 4

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	1 hour	1 and half hours
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	4 hours or more	Less than 30 minutes
Length of stay at the hospital before going home	5 days	3 days
Risk of dying from the illness	Moderate (5 in 100 patients)	Mild (3 in 100 patients)
Risk of being re-admitted to the hospital after going home	Moderate (5 in 100 patients)	Mild (3 in 100 patients)
Outpatient care after emergency treatment	At your local hospital	At a hospital which is about an extra 1 hour travel time from your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 5

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	1 and half hours	1 hour
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	2 and half hours	1 hour
Length of stay at the hospital before going home	3 days	5 days
Risk of dying from the illness	Moderate (5 in 100 patients)	Mild (3 in 100 patients)
Risk of being re-admitted to the hospital after going home	Mild (3 in 100 patients)	Moderate (5 in 100 patients)
Outpatient care after emergency treatment	At a hospital which is about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 6

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	Less than 30 minutes	1 and half hours
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	1 hour	2 and half hours
Length of stay at the hospital before going home	6 days or more	3 days
Risk of dying from the illness	High (7 in 100 patients)	Mild (3 in 100 patients)
Risk of being re-admitted to the hospital after going home	Low (1 in 100 patients)	Mild (3 in 100 patients)
Outpatient care after emergency treatment	At a hospital which is about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 7

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	2 hours or more	Less than 30 minutes
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	Less than 30 minutes	4 hours or more
Length of stay at the hospital before going home	6 days or more	1 day or less
Risk of dying from the illness	Moderate (5 in 100 patients)	Mild (3 in 100 patients)
Risk of being re-admitted to the hospital after going home	Low (1 in 100 patients)	High (7 in 100 patients)
Outpatient care after emergency treatment	At a hospital which is about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 8

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	1 and half hours	1 hour
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	1 hour	2 and half hours
Length of stay at the hospital before going home	3 days	5 days
Risk of dying from the illness	Mild (3 in 100 patients)	Moderate (5 in 100 patients)
Risk of being re-admitted to the hospital after going home	Mild (3 in 100 patients)	Moderate (5 in 100 patients)
Outpatient care after emergency treatment	At your local hospital	At a hospital which is about an extra 1 hour travel time from your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 9

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	2 hours or more	1 and half hours
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	4 hours or more	2 and half hours
Length of stay at the hospital before going home	1 day or less	3 days
Risk of dying from the illness	Low (1 in 100 patients)	Mild (3 in 100 patients)
Risk of being re-admitted to the hospital after going home	High (7 in 100 patients)	Mild (3 in 100 patients)
Outpatient care after emergency treatment	At your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 10

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	Less than 30 minutes	2 hours or more
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	1 hour	2 and half hours
Length of stay at the hospital before going home	1 day or less	6 days or more
Risk of dying from the illness	High (7 in 100 patients)	Low (1 in 100 patients)
Risk of being re-admitted to the hospital after going home	Low (1 in 100 patients)	High (7 in 100 patients)
Outpatient care after emergency treatment	At a hospital which is about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 11

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	Less than 30 minutes	2 hours or more
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	2 and half hours	1 hour
Length of stay at the hospital before going home	6 days or more	1 day or less
Risk of dying from the illness	Low (1 in 100 patients)	High (7 in 100 patients)
Risk of being re-admitted to the hospital after going home	Moderate (5 in 100 patients)	Mild (3 in 100 patients)
Outpatient care after emergency treatment	At a hospital which is about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 12

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	Hospital B
Travel time to hospital	2 hours or more	Less than 30 minutes
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	4 hours or more	Less than 30 minutes
Length of stay at the hospital before going home	6 days or more	1 day or less
Risk of dying from the illness	High (7 in 100 patients)	Low (1 in 100 patients)
Risk of being re-admitted to the hospital after going home	High (7 in 100 patients)	Low (1 in 100 patients)
Outpatient care after emergency treatment	At a hospital which is about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 13

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	1 and half hours	1 hour
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	Less than 30 minutes	4 hours or more
Length of stay at the hospital before going home	5 days	3 days
Risk of dying from the illness	Mild (3 in 100 patients)	Moderate (5 in 100 patients)
Risk of being re-admitted to the hospital after going home	High (7 in 100 patients)	Low (1 in 100 patients)
Outpatient care after emergency treatment	At your local hospital	At a hospital which is about an extra 1 hour travel time from your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Could you please indicate how easy or difficult it has been to complete the above choice sets (Please tick only one of the boxes)

Very difficult ☐

Difficult ☐

Somewhat Difficult ☐

Neutral ☐

Somewhat Easy ☐

Easy ☐

Very Easy ☐

Finally, we would be grateful if you could provide the following information about you. (Remain assured that no questions will identify who you are)

Are you a male or female? (Please tick one of the boxes below)

Male ☐

Female ☐

Prefer not to say ☐

Which of the following age group do you belong to? (Please tick one of the boxes below)

16-29 ☐ 30-34 ☐ 35-39 ☐

40-44 ☐ 45-49 ☐ 50-54 ☐

55-59 ☐ 60-64 ☐ 65-69 ☐

70-75 ☐ 75-79 ☐ 80-84 ☐

85+ ☐

What is your post code? (Please fill in below; we only need your partial post code, not the house/flat or street name, example NE30)

What is the name of the GP surgery you are registered with? (Please write in the space below. Please note we will not contact them. This is simply to help understand the results of the survey better).

……

In the last 12 months how many times have you visited the hospital with emergency healthcare need?

0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 or more ☐

Under each heading, please tick the ONE box that best describes your current state of health.

MOBILITY

I have no problems in walking about ☐

I have slight problems in walking about ☐

I have moderate problems in walking about ☐

I have severe problems in walking about ☐

I am unable to walk about ☐

SELF-CARE

I have no problems washing or dressing myself ☐

I have slight problems washing or dressing myself ☐

I have moderate problems washing or dressing myself ☐

I have severe problems washing or dressing myself ☐

I am unable to wash or dress myself ☐

USUAL ACTIVITIES (e.g. work, study, housework, family or leisure activities)

I have no problems doing my usual activities ☐

I have slight problems doing my usual activities ☐

I have moderate problems doing my usual activities ☐

I have severe problems doing my usual activities ☐

I am unable to do my usual activities ☐

PAIN / DISCOMFORT

I have no pain or discomfort ☐

I have slight pain or discomfort ☐

I have moderate pain or discomfort ☐

I have severe pain or discomfort ☐

I have extreme pain or discomfort ☐

ANXIETY / DEPRESSION

I am not anxious or depressed ☐

I am slightly anxious or depressed ☐

I am moderately anxious or depressed ☐

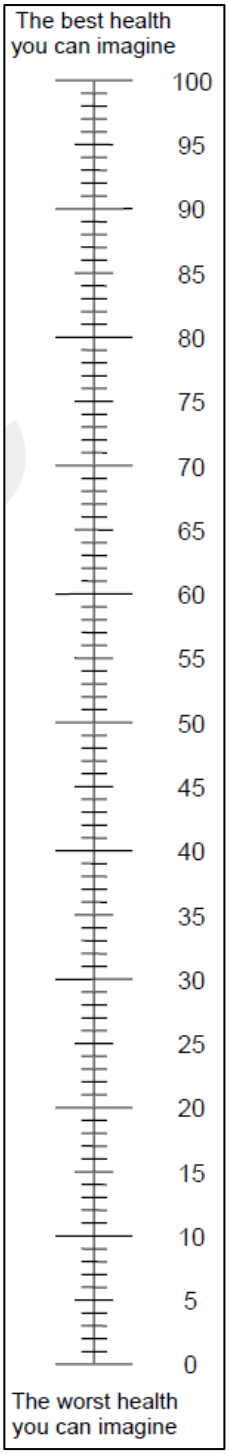
I am severely anxious or depressed ☐

I am extremely anxious or depressed ☐

How would you rate the current state of your health? (Please indicate by marking whichever point on the scale below indicates how good or bad your health state is today, imagining best state is marked 100 and the worst state is marked 0**)**

Now please write the number you marked on the scale in the box below

Your health today = ☐



Thank you for taking part in this survey.

Survey on Hospital Preferences

(Block-2)

This survey is being carried out by a researcher in health economics at the Institute of Health & Society, Newcastle University. We would like to know what is important to you when thinking about hospitals which provide accident and emergency care. To do this we will ask you to **make a series of choices between two hospitals** which do not exist, but this will allow us to understand what people think is important when designing emergency services. We would like to know which hospital you personally would prefer to go to if you were suddenly unwell and had called 999, and whether your view would change if the hospitals performed differently e.g. reduced or increased waiting times or survival rates. We have not suggested a reason why you would be unwell, but it is not a painful condition. You would require treatment on the same day to feel better and this can only be given in hospital.

The answers you provide here will only be used for research purposes and will not directly affect the healthcare that you need. There are no right or wrong choices, we are just interested in knowing your views. **You cannot be identified from your answers**. Please do not write anything which might give away your identity.

The hospitals **differ** in terms of the following ways:

7) **Travel time to the hospital**: This is the time it takes you to reach the hospital by ambulance.
8) **Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment**: This is the time you need to wait at the A&E to be given specific treatment for your problem by a doctor or nurse.
9) **Length of stay at the hospital before going home:** This is the number of days you need to stay in this hospital.

10) **Risk of dying from the illness:** This is a comparison of the average number of persons dying because of this illness after attending hospital.

11) **Risk of being re-admitted to the hospital after going home:** This is the likelihood of being re-admitted to the hospital after you are discharged.

12) **Outpatient care after emergency treatment:** This is the hospital you need to go for outpatient care after discharge following your emergency treatment.

All other aspects of the two hospitals are the same.

Example of the task (*Please do not fill this one*)

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, Hospital A and Hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	Hospital B
Travel time to hospital	1 and half hours	1 hour
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	4 hours or more	Less than 30 minutes
Length of stay at the hospital before going home	3 days	5 days
Risk of dying from the illness	Moderate (5 in 100 patients)	Mild (3 in 100 patients)
Risk of being re-admitted to the hospital after going home	Mild (3 in 100 patients)	Moderate (5 in 100 patients)
Outpatient care after emergency treatment	At a hospital which is about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box)	☐	☐

In this example,

- It takes 1 and half hours to reach hospital A and takes 1 hour to reach hospital B.
- You need to wait 4 hours or more in the A&E to be treated in hospital A, but less than 30 minutes hospital B.
- The length of stay in Hospital A is 3 days whereas it is 5 days in Hospital B.
- Patient has moderate risks of death in Hospital A but has mild risks in Hospital B.
- The risk of being re-admitted is mild for Hospital A and is moderate for Hospital B.
- Outpatient care, after emergency treatment, at hospital B is provided at local hospital and at hospital A is provided at a hospital which is about 1 hour travel time away from the local hospital.

  Here if hospital B is chosen, the box in the Hospital B column is marked with a √ in the box. Or if hospital A is chosen, the box in the Hospital A column is marked with √.

In addition, we will ask you few other questions about you, but remain assured that no questions will identify who you are.

It takes about 15 minutes to complete the survey. Your participation in this survey is voluntary and you can stop at any time without providing any reason. If you do complete the survey it is not possible to remove your answers later. We cannot identify them, but nobody else will know your answers either. Should you have any queries regarding the survey you can contact the researcher on this telephone 01912087821, or email: nawaraj.bhattarai@ncl.ac.uk .

If you agree to take part in this survey, then please choose which emergency hospital you would like to go to in the following situations. **Please note that in each of the situations the characteristics of hospitals change**.

For each situation please indicate which hospital you prefer by putting a tick (√) in the appropriate box.

Scenario 1

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	2 hours or more	Less than 30 minutes
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	Less than 30 minutes	4 hours or more
Length of stay at the hospital before going home	6 days or more	1 day or less
Risk of dying from the illness	Moderate (5 in 100 patients)	Low (1 in 100 patients)
Risk of being re-admitted to the hospital after going home	Mild (3 in 100 patients)	Moderate (5 in 100 patients)
Outpatient care after emergency treatment	At your local hospital	At a hospital which is about an extra 1 hour travel time from your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 2

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	Less than 30 minutes	2 hours or more
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	2 and half hours	1 hour
Length of stay at the hospital before going home	6 days or more	1 day or less
Risk of dying from the illness	Low (1 in 100 patients)	High (7 in 100 patients)
Risk of being re-admitted to the hospital after going home	High (7 in 100 patients)	Low (1 in 100 patients)
Outpatient care after emergency treatment	At a hospital which is about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 3

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	Less than 30 minutes	2 hours or more
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	Less than 30 minutes	4 hours or more
Length of stay at the hospital before going home	1 day or less	6 days or more
Risk of dying from the illness	Low (1 in 100 patients)	High (7 in 100 patients)
Risk of being re-admitted to the hospital after going home	High (7 in 100 patients)	Low (1 in 100 patients)
Outpatient care after emergency treatment	At a hospital which about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 4

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	Less than 30 minutes	2 hours or more
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	2 and half hours	Less than 30 minutes
Length of stay at the hospital before going home	3 days	5 days
Risk of dying from the illness	High (7 in 100 patients)	Low (1 in 100 patients)
Risk of being re-admitted to the hospital after going home	Low (1 in 100 patients)	High (7 in 100 patients)
Outpatient care after emergency treatment	At your local hospital	At a hospital which is about an extra 1 hour travel time from your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 5

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	1 hour	1 and half hours
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	1 hour	2 and half hours
Length of stay at the hospital before going home	5 days	3 days
Risk of dying from the illness	Mild (3 in 100 patients)	Moderate (5 in 100 patients)
Risk of being re-admitted to the hospital after going home	Mild (3 in 100 patients)	Moderate (5 in 100 patients)
Outpatient care after emergency treatment	At your local hospital	At a hospital which is about an extra 1 hour travel time from your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 6

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	2 hours or more	1 and half hours
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	4 hours or more	1 hour
Length of stay at the hospital before going home	6 days or more	3 days
Risk of dying from the illness	Low (1 in 100 patients)	Moderate (5 in 100 patients)
Risk of being re-admitted to the hospital after going home	Low (1 in 100 patients)	Low (1 in 100 patients)
Outpatient care after emergency treatment	At your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 7

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	1 hour	1 and half hours
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	4 hours or more	Less than 30 minutes
Length of stay at the hospital before going home	3 days	5 days
Risk of dying from the illness	Moderate (5 in 100 patients)	Mild (3 in 100 patients)
Risk of being re-admitted to the hospital after going home	Moderate (5 in 100 patients)	Mild (3 in 100 patients)
Outpatient care after emergency treatment	At your local hospital	At a hospital which is about an extra 1 hour travel time from your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 8

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	2 hours or more	Less than 30 minutes
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	Less than 30 minutes	4 hours or more
Length of stay at the hospital before going home	1 day or less	6 days or more
Risk of dying from the illness	Mild (3 in 100 patients)	Moderate (5 in 100 patients)
Risk of being re-admitted to the hospital after going home	High (7 in 100 patients)	Low (1 in 100 patients)
Outpatient care after emergency treatment	At a hospital which is about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 9

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	Less than 30 minutes	1 and half hours
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	Less than 30 minutes	1 hour
Length of stay at the hospital before going home	1 day or less	3 days
Risk of dying from the illness	High (7 in 100 patients)	Moderate (5 in 100 patients)
Risk of being re-admitted to the hospital after going home	High (7 in 100 patients)	Low (1 in 100 patients)
Outpatient care after emergency treatment	At a hospital which is about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 10

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	Hospital B
Travel time to hospital	1 and half hours	1 hour
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	4 hours or more	Less than 30 minutes
Length of stay at the hospital before going home	6 days or more	1 day or less
Risk of dying from the illness	Low (1 in 100 patients)	High (7 in 100 patients)
Risk of being re-admitted to the hospital after going home	Low (1 in 100 patients)	High (7 in 100 patients)
Outpatient care after emergency treatment	At a hospital which is about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 11

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	2 hours or more	Less than 30 minutes
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	4 hours or more	Less than 30 minutes
Length of stay at the hospital before going home	1 day or less	6 days or more
Risk of dying from the illness	Low (1 in 100 patients)	High (7 in 100 patients)
Risk of being re-admitted to the hospital after going home	Low (1 in 100 patients)	High (7 in 100 patients)
Outpatient care after emergency treatment	At a hospital which is about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 12

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	Hospital B
Travel time to hospital	2 hours or more	Less than 30 minutes
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	4 hours or more	Less than 30 minutes
Length of stay at the hospital before going home	6 days or more	1 day or less
Risk of dying from the illness	High (7 in 100 patients)	Low (1 in 100 patients)
Risk of being re-admitted to the hospital after going home	High (7 in 100 patients)	Low (1 in 100 patients)
Outpatient care after emergency treatment	At a hospital which is about an extra 1 hour travel time from your local hospital	At your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Scenario 13

Imagine you have an emergency healthcare need which requires calling an ambulance. Below are two hospitals, hospital A and hospital B, each with different characteristics. If you have a choice, which hospital would you choose from below?

	Hospital A	**Hospital B**
Travel time to hospital	1 and half hours	1 hour
Waiting time in the A&E department to be seen by a doctor or nurse who can provide treatment	1 hour	2 and half hours
Length of stay at the hospital before going home	5 days	3 days
Risk of dying from the illness	High (7 in 100 patients)	Low (1 in 100 patients)
Risk of being re-admitted to the hospital after going home	Moderate (5 in 100 patients)	Mild (3 in 100 patients)
Outpatient care after emergency treatment	At your local hospital	At a hospital which is about an extra 1 hour travel time from your local hospital
Which hospital would you choose to go in an emergency? (Please tick one box**)**	☐	☐

Could you please indicate how easy or difficult it has been to complete the above choice sets (Please tick only one of the boxes)

Very difficult ☐

Difficult ☐

Somewhat Difficult ☐

Neutral ☐

Somewhat Easy ☐

Easy ☐

Very Easy ☐

Finally, we would be grateful if you could provide the following information about you. (Remain assured that no questions will identify who you are)

Are you a male or female? (Please tick one of the boxes below)

Male ☐

Female ☐

Prefer not to say ☐

Which of the following age group do you belong to? (Please tick one of the boxes below)

16-29 ☐ 30-34 ☐ 35-39 ☐

40-44 ☐ 45-49 ☐ 50-54 ☐

55-59 ☐ 60-64 ☐ 65-69 ☐

70-75 ☐ 75-79 ☐ 80-84 ☐

85+ ☐

What is your post code? (Please fill in below; we only need your partial post code, not the house/flat or street name, example NE30)

What is the name of the GP surgery you are registered with? (Please write in the space below. Please note we will not contact them. This is simply to help understand the results of the survey better).

……

In the last 12 months how many times have you visited the hospital with emergency healthcare need?

0 ☐ 1 ☐ 2 ☐ 3 ☐ 4 or more ☐

Under each heading, please tick the ONE box that best describes your current state of health.

MOBILITY

I have no problems in walking about ☐

I have slight problems in walking about ☐

I have moderate problems in walking about ☐

I have severe problems in walking about ☐

I am unable to walk about ☐

SELF-CARE

I have no problems washing or dressing myself ☐

I have slight problems washing or dressing myself ☐

I have moderate problems washing or dressing myself ☐

I have severe problems washing or dressing myself ☐

I am unable to wash or dress myself ☐

USUAL ACTIVITIES (e.g. work, study, housework, family or leisure activities)

I have no problems doing my usual activities ☐

I have slight problems doing my usual activities ☐

I have moderate problems doing my usual activities ☐

I have severe problems doing my usual activities ☐

I am unable to do my usual activities ☐

PAIN / DISCOMFORT

I have no pain or discomfort ☐

I have slight pain or discomfort ☐

I have moderate pain or discomfort ☐

I have severe pain or discomfort ☐

I have extreme pain or discomfort ☐

ANXIETY / DEPRESSION

I am not anxious or depressed ☐

I am slightly anxious or depressed ☐

I am moderately anxious or depressed ☐

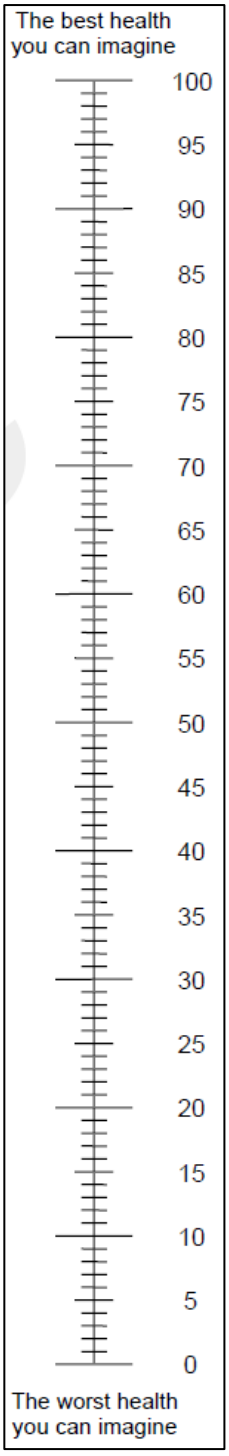
I am severely anxious or depressed ☐

I am extremely anxious or depressed ☐

How would you rate the current state of your health? (Please indicate by marking whichever point on the scale below indicates how good or bad your health state is today, imagining best state is marked 100 and the worst state is marked 0**)**

Now please write the number you marked on the scale in the box below

Your health today = ☐



Thank you for taking part in this survey.