



July 2018

# First aid intervention in the adult population: Yorkshire Health Study and its implications for first aid education

Eleanor Holding

*University of Sheffield, e.holding@sheffield.ac.uk*

Clare Relton

*University of Sheffield, c.relton@sheffield.ac.uk*

Katharine Roberts

*University of Sheffield, keroberts@hotmail.co.uk*

Emily Oliver

*British Red Cross, eoliver@redcross.org.uk*

Follow this and additional works at: <https://digitalcommons.kent.edu/ijfae>

 Part of the [Accessibility Commons](#), [Community Health and Preventive Medicine Commons](#), [Curriculum and Instruction Commons](#), [Curriculum and Social Inquiry Commons](#), [Educational Assessment, Evaluation, and Research Commons](#), [Educational Methods Commons](#), [Health and Physical Education Commons](#), [Health Services Administration Commons](#), [International Public Health Commons](#), and the [Public Health Education and Promotion Commons](#)

### Recommended Citation

Holding, Eleanor; Relton, Clare; Roberts, Katharine; and Oliver, Emily (2018) "First aid intervention in the adult population: Yorkshire Health Study and its implications for first aid education," *International Journal of First Aid Education*: Vol. 1 : Iss. 2 , Article 1. DOI: 10.21038/ijfa.2017.0009

Available at: <https://digitalcommons.kent.edu/ijfae/vol1/iss2/1>

This Original Article is brought to you for free and open access by Digital Commons @ Kent State University Libraries. It has been accepted for inclusion in International Journal of First Aid Education by an authorized editor of Digital Commons @ Kent State University Libraries. For more information, please contact [digitalcommons@kent.edu](mailto:digitalcommons@kent.edu).

---

# First aid intervention in the adult population: Yorkshire Health Study and its implications for first aid education

## **Cover Page Footnote**

Acknowledgements We are grateful to all the individuals who have enrolled in the cohort. This publication is the work of the authors and does not necessarily reflect the views of the Yorkshire Health Study Management Team or Advisory Group, or the British Red Cross. This paper presents independent research by the National Institute for Health Research Collaboration for Leadership in Applied Health Research and Care Yorkshire and Humber (NIHR CLAHRC YH, <http://clahrc-yh.nihr.ac.uk/>). The views and opinions expressed are those of the authors, and not necessarily those of the NHS, the NIHR or the Department of Health. Funding The research was funded by the British Red Cross and the National Institute for Health Research Collaboration for Leadership in Applied Health Research and Care Yorkshire and Humber (NIHR CLAHRC YH, <http://clahrc-yh.nihr.ac.uk/>)



## Descriptive Study

# First aid intervention in the adult population: the Yorkshire Health Study and its implications for first aid education

Eleanor Holding, Clare Relton, Katharine Roberts, Emily Oliver

### Abstract

**Background:** First aid can reduce death, injury and suffering, but little is known about the characteristics of those who actually give and receive it. The aim of this study was to conduct a first aid behavior survey of a large adult population in the United Kingdom.

**Methods:** A survey (web and postal) of adults was conducted between 2013 and 2015 as part of the Yorkshire Health Study. Two questions were asked about their first aid behavior: whether participants had administered first aid and if yes, their relationship to the first aid recipient.

**Results:** Of the 13,584 adults who responded, 11.6% reported having given first aid to someone in the previous year, of whom three quarters (76.3%) knew the recipient. Women, those aged 26-45, those with 2-4 children, and people on higher incomes were more likely to report having given first aid. Although young people were less likely to provide first aid, they were more likely to have assisted strangers.

**Conclusion:** Despite the limitations of this study, analysis of this dataset provides a profile of self-defined first aiders in Yorkshire, UK. The findings can be used to inform the development of future population based interventions such as targeted first aid education, providing a foundation for future research.

The actions of the first person on the scene in a medical emergency can be critical. Yet every year in the United Kingdom (UK) thousands of people die due to ineffective bystander action (NHS Choices, 2016). The period of time between an accident or emergency occurring and hospital intervention is critical for patient outcomes: one study showed that of those who died having been attended to by emergency services, 37.1% died before they reached hospital, and 30.8% died soon after (Dean et al, 2014). However, many deaths relating to

accident and emergencies are preventable with appropriate pre hospital intervention (NHS Choices, 2016). In a UK study of accident-related deaths reported to the coroner between 1987 and 1990, Hussain and Redmond (1994) estimated 39% were potentially preventable by appropriate action taken by the public in the immediate minutes after injury. While a study carried out in Australia examining deaths by cardiac arrest in 2003 estimated around 5% of deaths may have been

prevented through 'bystander first-aid' (Ashour et al, 2007).

Despite recognition of the importance of first aid for preventing unnecessary deaths, the numbers administering it are small and wider education of the population in first aid skills and training is required (Ashour et al, 2007; Van de Velde et al, 2009). Although there is widespread agreement amongst the British population that first aid helps to save lives, a survey carried out by St John Ambulance reveals a large-scale absence of first aid knowledge and specific first aid skills (St John Ambulance, 2015a). International studies have also revealed gaps in public knowledge of first aid relating to burns (Harvey et al, 2007) and in how to respond to road traffic accidents (Arbon, Hayes & Woodman, 2011).

A lack of knowledge and skills is associated with reduced willingness and confidence to attempt first aid. Research commissioned by the British Red Cross found that while 93% of people will call for help from the emergency services, up to 59% will then provide no further first aid intervention (McNulty, 2016; Oliver, Walter, & Redmond, 2017). St John Ambulance also report that while a large majority of the general public will call for help in an accident and emergency, only 59% of people would feel confident to try and to save a life, 40% will attempt first aid and only around 14% will attempt cardiopulmonary resuscitation (CPR) (St John Ambulance 2015a; St John Ambulance 2015b). This research demonstrates a significant lack of bystander intervention to help people in medical emergencies, although further study is needed to understand the types of intervention people are willing to provide. Ineffective bystander intervention not only has implications for the individual whose life could be saved, but also for Accident & Emergency (A&E) departments that are becoming increasingly overextended due to avoidable attendances. Data from the Royal Society for the Prevention of Accidents (RoSPA) shows

that a large number of cases admitted to A&E departments, e.g. from bone injuries, chemical injuries and wounds, could have been treated with first aid (British Red Cross, 2016). Further to this, there are over 100,000 admissions related to heart attacks and cardiac arrest per year accounting for large numbers of deaths in the UK (British Red Cross, 2016). In these cases early bystander CPR facilitated between collapse and defibrillation can have a great effect on patient outcomes, but is still not widely rendered in an emergency situation (Bobrow, Panzcynek & Subido, 2012).

Even when first aid knowledge and a willingness to intervene are assumed, the intervention's quality may be variable. A study of English youth football officials responsible for dealing with injuries found that only 12% and 38% respectively gave correct answers to scenarios of 'player choking' and 'player unconsciousness' (Cunningham & Jackson, 2012) while a survey of healthcare workers and non-healthcare workers first aid knowledge in burns found that only 16% and 30% achieved correct answers for all questions (Tay, Pinder, Coulson & Rawlin, 2013). Although it could be argued that these studies lack consistency of measurement both regarding skills and confidence, they nonetheless point to inadequacies in knowledge in resuscitation and how to treat injuries, which could be directly relevant to the effectiveness or quality of education that learners have received. This need for better first aid education is supported by studies of behaviour change which tell us that educational approaches incorporating confidence and willingness building techniques can improve rates of intention to act in an emergency situation (Oliver, Cooper & McKinney, 2014).

Despite interest in the importance of first aid, there is a scarcity of research in the UK, which seeks to understand the characteristics of, and the social distance between, those who give and receive it. The objective of this study was to reveal a profile of self-defined first aiders within Yorkshire in order

to develop an understanding of the relationship between the giver and receiver. The analysis is based on the responses of 13,584 individuals who responded to the first aid questions collected from a regional cohort study (the Yorkshire Health Study). The findings will be used to inform future population based interventions such as targeted first aid education, and provide a foundation for future research.

## Methods

### *Data and sampling*

The Yorkshire Health Study (YHS) is a regional longitudinal cohort study collecting health information on the residents of the Yorkshire and Humber region in England. Set up in 2010 as the South Yorkshire Cohort (SYC) (Relton et al, 2011), the study aims to gather up-to-date information on the health needs, behaviours and resource use of the local population. It also seeks to provide a rapid and economical recruitment platform for randomised controlled trials and other forms of health research. Ethical approval for this study was obtained from the Leeds East National Health Service (NHS) Research Ethics Committee (ref: 09/H1306/97).

In 2010 as part of the first wave of data collection for the South Yorkshire Cohort (2010-2012), 43 General Practice surgeries across South Yorkshire sent a letter of invitation and a eight page health questionnaire (Health Questionnaire 1 – HQI) to all their patients aged 16-85. Of the 156,886 questionnaires sent out, 27,806 questionnaires were returned (a response rate of 17.7%). In total 24,994 (15.9%) respondents were included in the cohort. 22,179 (88.7%) gave consent to being contacted again and 22,150 (88.6%) gave consent for researchers to look at their health records. Self-reported data was collected on a wide range of variables including health related behaviour, health care usage and quality of life.

In 2012, working in partnership with the British Red Cross, two first aid questions were added to the second health questionnaire (HQ II). These questions were: *'Have you given first aid in the last year?'* yes/no, and *'If yes, did you know the person?'* yes/no. No definition of first aid was provided. Initially (2013-2015) HQII was sent to all participants who had agreed to be contacted again from the first wave (22,179). However, in 2014 the study was renamed the Yorkshire Health Study and a citizen recruitment strategy was adopted to extend the study across the wider Yorkshire and Humber region. An online version of Health Questionnaire II was made available on the study website ([www.yorkshirehealthstudy.org](http://www.yorkshirehealthstudy.org)), and a marketing and media plan was developed alongside small scale recruitment projects piloted by a variety of National Health Service (NHS), Local Authority and Third Sector organisations. HQII is still being completed (including the two first aid questions) (average n=500 per month), thus providing the potential for further analysis if required. 14,627 people have completed HQII questionnaires.

### *Analysis*

The YHS HQII first aid questions were answered by 13,584 survey participants. The data set was analysed to examine the responses by the following variables in the dataset: sex, age, income, main activity (in terms of work and exercise), long term illnesses, satisfaction with life rating, income bracket, number of individuals living in the household, whether they had a spouse or partner, number of children, and the hours spent caring. Some participants did not provide responses for all questions or provided more than one response for questions where only one was requested. Thus, not all reported results are based on a denominator that reflects the reported total participants' figure of 13,584 (See Tables I and II). In addition, it transpired that the numbers answering Q2 exceeded the number reporting

giving first aid in Q1. Anomalies of this kind are common in self-report questionnaires and decisions have to be taken on whether to retain them in order to maintain the complexity of the data set. However, this can limit the capacity to draw out data patterns and policy lessons. In this case, the decision was taken to only include cases in Q2 who had answered positively to Q1. This has not altered the distribution of responses in significant ways, although it has inevitably led to some reduction in sample size for Q2 (from 1822 to 1551).

All analyses were conducted in SPSS version 21. Relevant results are contained in this article but other results are available on request.

## **Results**

A total of 13,584 (out of 14,627 respondents to HQII) responded to the question “*Have you given first aid in the last year?*” of whom 11.6% (n=1576) said yes and 88.4% said no (n=12008), see Table 1.

Of those who responded to the question “*If yes, did you know the person?*” 76.3% reported “yes” (n=1184).

For those for whom gender data was available, 5463 (40.2%) males and 8121 (59.8%) females answered the first aid questions. Women were more likely to report giving first aid (13.4%, n=1091) than men (8.9%, n=485). Around three quarters of both women and men knew the person to whom they gave first aid (78.1% and 72.3% respectively)

### *Age group*

Giving first aid was more frequently reported by those aged 36-45 (20.7%), most of whom (78.9%) reported that they knew the person.

First aid intervention was similar for those aged 56-65 and under 25 (11% and 12.2% respectively). Those in the youngest age group were more likely to give first aid to someone they did not know

compared to those in the older group (34.6% and 20.8%)

A lower level of first aid intervention was reported by those aged 66 and over (4.3%), overwhelmingly to people they knew (83.2%).

### *Spouse/Partner*

Those who had a spouse/partner living with them (n= 9616) were more likely to report having given first aid (12.5%) compared to those that did not (9.3%). Similar proportions of those living with a spouse/partner and those living alone reported giving first aid to someone they knew (78.2% and 70.9%

### *Number of children*

Households with 2 or more children were most likely to report having given first aid (2: 23.3%, 3: 28.9%, 4: 21.6%) compared to 10.1% of those with no children. In every case respondents were more likely to have given first aid to someone they knew.

### *Main Activity*

Employed people were most likely to report having given first aid (18%), and retired people and unemployed people were least likely (5.1% and 4.1% respectively - see Table 2).

Although the number of respondents in the sample who reported that they were ‘seeking work’ was relatively small (n=67), 14.9% of these reported having given first aid, making them the second highest category of first aiders. The percentage of those with caring responsibilities giving first aid was slightly lower at 14.2%.

Low numbers of students gave first aid (10.4%), but over a third (36.4%) gave it someone they didn’t know. The proportion of homemakers giving first aid was similar to the students (11.4%) but they were much less likely to have given it to

someone they did not know (7.1%). In contrast, those reporting long term sickness were much more likely to give first aid to a stranger (21.7%)

*Income*

The higher a person’s income the more likely they were to report having given first aid. Of those

earning £4000 per month or more, 19.3% reported giving first aid, falling to 13.1% for those earning between £1,500-£2,499 a month and to 7.7% for those with a monthly income of less than £500. In terms of the recipient, similar proportions of each income group gave first aid to someone they knew (around three quarters).

**Table 1: Responses to first aid questions by gender, age group, spouse/partner, number of children**

| Whole sample proportions               | Have you given first aid in the last year? (%)<br>(n=13584) |                 | If, yes did you know the person? (%)<br>(n=1551) |               |
|--|---|-----------------|--|---------------|
|  | Yes   | No              | Yes  | No            |
|  | 11.6% (n=1576)  | 88.4% (n=12008) | 76.3% (n=1184)                                   | 23.7% (n=367) |
| <b>Gender (n)</b>                      | <b>Have you given first aid in the last year? (%)</b>       |                 | <b>If, yes did you know the person? (%)</b>      |               |
| Male (5463)<br>40.2%                   | 8.9 (485)   | 91.1 (4978)     | 72.3 (345)                                       | 27.7 (132)    |
| Female (8121)<br>59.8%                 | 13.4 (1091)   | 86.6 (7030)     | 78.1 (839)                                       | 21.9 (235)    |
| <b>Age group (n)</b>                   | <b>Have you given first aid in the last year? (%)</b>       |                 | <b>If, yes did you know the person? (%)</b>      |               |
|  | Yes   | No              | Yes  | No            |
| Under 25 (657)                         | 12.2 (80)   | 87.8 (577)      | 65.4 (51)  | 34.6 (27)     |
| 26-35 (1272)                           | 20.2 (257)  | 79.8 (1015)     | 67.7 (172)                                       | 32.3 (82)     |
| 36-45 (1451)                           | 20.7 (301)  | 79.3 (1150)     | 78.9 (235)                                       | 21.1 (63)     |
| 46-55 (2271)                           | 17.6 (400)  | 82.4 (1871)     | 76.4 (301)                                       | 23.6 (93)     |
| 56-65 (2815)                           | 11.0 (309)  | 89.0 (2506)     | 79.2 (243)                                       | 20.8 (64)     |
| 66+ (4878)                             | 4.3 (211)   | 95.7 (4667)     | 83.2 (168)                                       | 16.8 (34)     |
| <b>Spouse/partner living with them</b> | <b>Have you given first aid in the last year? (%)</b>       |                 | <b>If, yes did you know the person? (%)</b>      |               |
|  | Yes   | No              | Yes  | No            |
| Yes (9616)                             | 12.5 (1205)   | 87.5 (8411)     | 78.2 (928)                                       | 21.8 (259)    |
| No (3898)                              | 9.3 (361)   | 90.7 (3537)     | 70.9 (251)                                       | 29.1 (103)    |
| <b>Number of children (n)</b>          | <b>Have you given first aid in the last year? (%)</b>       |                 | <b>If, yes did you know the person? (%)</b>      |               |
|  | Yes   | No              | Yes  | No            |
| 0 (8773)                               | 10.1 (884)  | 89.9 (7889)     | 72 (624)   | 28 (243)      |
| 1 (1199)                               | 19.2 (230)  | 80.8 (979)      | 80.3 (183)                                       | 19.7 (45)     |
| 2 (1106)                               | 23.3 (258)  | 76.7 (848)      | 82 (209)   | 18 (46)       |
| 3 (218)                                | 28.9 (63)   | 71.1 (155)      | 83.6 (51)  | 16.4 (10)     |
| 4 (37)                                 | 21.6 (8)  | 78.4 (29)       | 75 (6)   | 25 (2)        |

**Table 2: Responses to first aid questions by main activity, monthly income group**

| Main activity*   | Have you given first aid in the last year? (%) |             | If, yes did you know the person? (%) |            |
|--|--|-------------|--------------------------------------|------------|
|  | Yes  | No          | Yes                                  | No         |
| Employed (6114)  | 18.0 (1098)                                    | 82.0 (5016) | 74.5 (807)                           | 25.5 (276) |
| Retired (5673)   | 5.1 (291)                                      | 94.9 (5382) | 84.2 (239)                           | 15.8 (45)  |
| Homemaker (501)  | 11.4 (57)                                      | 88.6 (444)  | 92.9 (52)                            | 7.1 (4)    |
| Student (548)  | 10.4 (57)                                      | 89.6 (491)  | 63.6 (35)                            | 36.4 (20)  |
| Seeking work (67)  | 14.9 (10)                                      | 85.1 (57)   | 100 (10)                             | 0 (0)      |
| Unemployed (171)   | 4.1 (7)  | 95.9 (164)  | 100 (7)                              | 0 (0)      |
| Long term sick (304)   | 7.6 (23)                                       | 92.4 (281)  | 78.3 (18)                            | 21.7 (5)   |
| Those with caring responsibilities (212)   | 14.2 (30)                                      | 85.8 (182)  | 90.0 (27)                            | 10.0 (3)   |
| Other (206)  | 10.1 (31)                                      | 89.9 (275)  | 80.6 (25)                            | 19.4 (6)   |
| Monthly income group   | Have you given first aid in the last year? (%) |             | If, yes did you know the person? (%) |            |
|  | Yes  | No          | Yes                                  | No         |
| Less than £500 (455)   | 7.7 (35)                                       | 92.3 (420)  | 85.3 (29)                            | 14.7 (5)   |
| £500-£999 (1177)   | 5.9 (69)                                       | 94.1 (1108) | 77.6 (52)                            | 22.4 (15)  |
| £1000-£1499 (1556)   | 10.3 (161)                                     | 89.7 (1395) | 77.4 (123)                           | 22.6 (36)  |
| £1500-£1999 (1219)   | 13.1 (160)                                     | 86.9 (1059) | 75.5 (120)                           | 24.5 (39)  |
| £2000-£2499 (1103)   | 13.1 (144)                                     | 86.9 (959)  | 76.1 (108)                           | 23.9 (34)  |
| £2500-£2999 (910)  | 16.0 (146)                                     | 84.0 (764)  | 78.1 (114)                           | 21.9 (32)  |
| £3000-£3999 (1273)   | 17.0 (216)                                     | 83.0 (1057) | 77.0 (164)                           | 23.0 (49)  |
| £4000+ (1204)  | 19.3 (232)                                     | 80.7 (972)  | 69.7 (161)                           | 30.3 (70)  |
| <i>*these figures will not compute to 100% because participants ticked all that applied.</i> |  |             |                                      |            |

## Discussion

### *What is already known about the topic*

Despite recognition of the importance of first aid skills and knowledge for the prevention of unnecessary deaths, research into first aid knowledge and willingness to intervene remains heavily focused on skill acquisition and little is known about the characteristics of those who give and receive it.

This is the first population-based survey measuring first aid intervention in the region, and the first UK survey collecting data on the relationship between the giver and receiver. This study provides detailed self-reported first aid data from 13584 individuals within the context of a large regional population based health study – the YHS, a sample size notably larger than other similar surveys (Arbon, Hayes & Woodman, 2011; Harvey et al, 2011; St John Ambulance, 2015a; St John Ambulance, 2015b).

Due to the large sample size these findings can be used to make inferences on the first aid behaviour of the wider adult population and can therefore help inform future first aid research.

The low numbers of respondents reporting having given first aid reflects findings from other research signalling low levels of first aid knowledge and confidence amongst the British population (St John Ambulance, 2015a; St John Ambulance, 2015b; McNulty, 2016) (although consistent definitions of first aid are not used). However, what this study adds is a greater understanding of the characteristics of first aid givers. Despite small proportions, a diverse group of people in Yorkshire have recently given first aid, particularly those with children, the employed and high-income groups. This indicates a need for first aid skills, knowledge and confidence to use it across different population groups. Further, asking participants whether they knew the person to whom they gave first aid allows an assessment of bystander willingness to intervene

in the help of strangers. This is significant because bystander first aid has had limited academic attention despite its potential for improved survival rates at the scene of trauma (Tannvick, Bakke & Wisborg, 2012). Our survey indicated that students, the long-term sick and the employed were more likely to give first aid to someone they did not know, and these groups might now be approached to understand more about their motivation to help strangers.

*Foundation for future research*

Despite the need for a wider dissemination of skills and knowledge relating to first aid, few studies provide a consistent measurement of the effectiveness of first aid education. This is evident in guidelines for first aid and resuscitation, produced in 2015 by ILCOR (ILCOR, 2015) which focus heavily on evidence which supports particular medical interventions, but seriously lack evidence on the preparedness of responders or even on lay responder recognition of emergencies (Pellegrino, Oliver & Freshour, 2016). To the extent that behavioural considerations are seen as crucial in first aid education (Oliver, Cooper & McKinney, 2014), skills-based research may fail to accurately assess whether those possessing first aid skills would actually use them in real life situations.

The data collected in this study provides detailed information on the demographics, socio-economic status, family makeup and day-to-day activities of self-defined first aiders in the YHS. This information can be used to target recruitment strategies to increase first aid education uptake in subgroups of the population where prevalence of first aid administration is lower than other groups (e.g. men, the unemployed, students) (see Table I and Table II). For example, the low levels of first aid provision amongst students, points to a possible need for marketing strategies aimed at institutions and venues popular with young people in higher education.

The YHS is also useful as it provides a unique regional population based facility for testing the effectiveness and cost effectiveness of interventions to increase first aid knowledge and confidence in these subgroups using the Trials within Cohorts methodology (Relton et al, 2010).

***Limitations of this study***

There is no data on the context in which the first aid was given, or of a consistent understanding of what is meant by ‘first aid’. There is also a small amount of demographic bias in the YHS with a higher proportion of female, elderly, white ethnicities and participants from less deprived areas (Green et al, 2011). Recruitment to the YHS is ongoing (n= 54,000 – October 2017) and a number of strategies are being used to combat underrepresentation of different groups within this large population based study.

Given the YHS is based on a self-reported questionnaire (either online or paper), there is no researcher control over how respondents answer questions. Thus, participants were able to tick all that applied for the ‘main activity’ question. This has contributed to the figures not computing to 100% (See Table II). It was also the case that a very small number of respondents answered Q2 who did not answer Q1. These have been removed from the analysis thus reducing the sample size but without substantially altering the pattern of responses.

***Conclusion***

Analysis of this dataset provides a unique profile of the provision of first aid by the public. The large sample size allowed for analyses by demographic characteristics, socio-economic measures and other relevant variables included in the survey to provide a detailed profile of these sub-groups who have, and have not, administered first aid. This information can be used to inform the development of future interventions for specific sub groups of the population, with the ultimate aim

of improving the effectiveness of actions by those first on the scene in a medical emergency.

### ***Acknowledgements***

We are grateful to all the individuals who have enrolled in the cohort. This publication is the work of the authors and does not necessarily reflect the views of the Yorkshire Health Study Management Team or Advisory Group, or the British Red Cross.

### ***Funding***

This paper presents independent research by the National Institute for Health Research Collaboration for Leadership in Applied Health Research and Care Yorkshire and Humber (NIHR CLAHRC YH, <http://clahrc-yh.nihr.ac.uk/>). The views and opinions expressed are those of the authors, and not necessarily those of the NHS, the NIHR or the Department of Health. Funding The research was funded by the British Red Cross and the National Institute for Health Research Collaboration for Leadership in Applied Health Research and Care Yorkshire and Humber (NIHR CLAHRC YH, <http://clahrc-yh.nihr.ac.uk/>)

## References

- Arbon, P. Hayes, J. Woodman, R. (2011) First aid and harm minimization for victims of road trauma: a population study. *Prehospital Disaster Medicine*, 26(4):276-82. DOI:10.1017/S1049023X11006522
- Ashour, A. Cameron, P. Bernard, S. Fitzgerald, M. Smith, K. Walker, T. (2007) Could bystander first-aid prevent trauma deaths at the scene of injury? *Emergency Medicine Australasia*, 19(2):163–168. DOI: 10.1111/j.1742-6723.2007.00948.x
- Bobrow, B.J, Panzcynek, M. Subido, C. (2012) Dispatch-assisted cardiopulmonary resuscitation: the anchor link in the chain of survival. *Current opinion in critical care*, 18(3):228-33. DOI: 10.1097/MCC.0b013e328351736b
- British Red Cross (2016). Life. Live it. The case for first aid education in UK schools. 2006. Retrieved from: <http://www.redcross.org.uk/~media/BritishRedCross/Documents/What%20we%20do/First%20aid/Life%20Live%20it/Policy%20report.pdf>. Last accessed: 09/11/2016
- Cunningham, A. Jackson, P. (2002) An audit of first aid qualifications and knowledge among team officials in two English youth football leagues: a preliminary study. *British Journal of Sports Medicine*, 36(4):295–300
- Dean, D. Wetzel, B. White, N. Kupperman, N. Wang, E.N. Haukoos, S.J. et al. (2014). From 9-1-1 call to death: evaluating traumatic deaths in seven regions for early recognition of high-risk patients. *Journal of Trauma and Acute Care Surgery*, 76(3):846–853. doi: 10.1097/TA.0b013e3182aafd9a.
- Green, A. M, Relton, C. Strong, M. Kearns, B. Wu, M. Bissell, P. et al. (2011) Cohort Profile: The Yorkshire Health Study. *International Journal of Epidemiology*, 45(3):707-12. DOI:<https://doi.org/10.1093/ije/dyu121>
- Harvey, L. A, Barr, M. L, Poulos, R.G, Finch, C. F, Sherker, S. Harvey, J.G. (2011). A population-based survey of knowledge of first aid for burns in New South Wales. *The Medical Journal of Australia*, 195(8):465-8.
- Hussain, M. L, Redmond, D.A. (1994). Are pre-hospital deaths from accidental injury preventable? *British Medical Journal*, 308(6936):1077–1080. doi:<https://doi.org/10.1136/bmj.308.6936.1077>
- ILCOR Scientific Evidence Evaluation and Review System. (2015). Retrieved from: <https://volunteer.heart.org/apps/pico/pages/default.aspx>. Last accessed: 09/09/2016
- McNulty A. (2016) Are Prehospital Deaths From Trauma and Accidental Injury Preventable? A summary report. British Red Cross. Retrieved from: <http://www.redcross.org.uk/~media/BritishRedCross/Documents/What%20we%20do/First%20aid/Are%20Prehospital%20Deaths%20From%20Trauma%20and%20Accidental%20Injury%20Preventable%20Summary%20Report.pdf>

20prehospital%20deaths%20from%20trauma%20and%20accidental%20injury%20preventable.pdf. Last accessed: 31/01/2017

NHS Choices (2016). First Aid. Retrieved from: <http://www.nhs.uk/Conditions/Accidents-and-first-aid/Pages/Introduction.aspx>. Last accessed: 05/10/2016

Oliver, E. Cooper, J. McKinney, D. (2014). Can first aid training encourage individuals' propensity to act in an emergency situation? A pilot study. *Emergency Medicine Journal: EMJ*,31(6):518-20. DOI: 10.1136/emmermed-2012-20219

Oliver, G. J. Walter, D. P. Redmond, A. D. (2017). Are prehospital deaths from trauma and accidental injury preventable? A direct historical comparison to assess what has changed in two decades. *Injury*, 48(5), 978–984. <http://doi.org/10.1016/j.injury.2017.01.039>

Pellegrino, J.L, Oliver, E. Freshour, H. (2016) Filling the Voids in Emergency Response Education: a Gaps Analysis, presented as a poster at ERC Congress 2016, Reykjavik.

Relton, C. Bissell, P. Smith, C. et al. (2011) South Yorkshire Cohort: a 'cohort trials facility' study of health and weight - protocol for the recruitbobrowent phase. *BMC Public Health*, 11:640. DOI: 10.1186/1471-2458-11-640

Relton, C. O'Cathain, A. Nicholl, J. Torgerson, D. (2010) Rethinking pragmatic randomised controlled trials: Introducing the "cohort multiple randomised controlled trial" design. *BMJ*, 340 (7753):963-967. doi: <https://doi.org/10.1136/bmj.c1066>

Royal Society for the Prevention of Accidents (RoSPA) data 2000-2002, cited in British Red Cross. (2006) Life. Live it. The case for first aid education in UK schools. Retrieved from: <http://www.redcross.org.uk/~/media/BritishRedCross/Documents/What%20we%20do/First%20aid/Life%20Live%20It/Policy%20report.pdf>. Last accessed: 09/11/2016

St John Ambulance (2015a). Survey reveals low first aid confidence. Retrieved from: <https://www.sja.org.uk/sja/training-courses/training-news/dk-survey-news.aspx>. Last accessed: 18/08/2016

St John Ambulance. (2015b). Two out of three people couldn't save a life. Retrieved from: <http://www.sja.org.uk/sja/what-we-do/latest-news/news-archive/news-stories-from-2010/april/2-in-3-couldnt-save-a-life.aspx>. Last accessed: 22/08/2016

Tannvick, D.T. Bakke, K.H. Wisborg, T. (2012) Systematic literature review on first aid provided by laypeople to trauma victims. *Acta Anaesthesiol Scand*, 56(10):1222–1227. doi: 10.1111/j.1399-6576.2012.02739.x

Tay, H.P. Pinder, R. Coulson, S. Rawlin, J. (2013) First impressions last... A survey of knowledge of first aid in burn-related injuries amongst hospital workers. *Burns: Journal of the International Society of Burns Injuries*, 39(2):291–299. DOI:10.1016/j.burns.2012.05.013

Van de Velde, S. Heselmans, A. Roex, A. Vandekeckhove, P. Ramaerkers, D. Aertgeerts, B. (2009). Effectiveness of no resuscitative first aid training in lay persons: a systematic review. *Annals of Emergency Medicine*, 54(3):447-457. DOI:10.1016/j.annemergmed.2008.11.005