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Review

Removal of bra for pad placement and defibrillation – A scoping review

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Abstract

Background: In some regions, females are less likely to receive public-initiated resuscitation, potentially due to the need to expose the chest and breasts for proper automated external defibrillator (AED) pad placement. We conducted a scoping review to investigate the breadth of the existing literature and knowledge gaps on bra (brassière) removal and AED pad application.

Methods: Studies that examined bra removal and outcomes associated with AED pad placement and defibrillation in cardiac arrest were eligible. We searched three databases (Medline, Embase, and Cochrane) from inception to September 26, 2024. Google and Google Scholar (first 20 pages) were searched for grey literature on October 1, 2024. The study followed the scoping review framework by the Joanna Briggs Institute.

Results: The search identified 287 references. Three studies met the eligibility criteria, including one animal and two manikin studies, of which two were conference abstracts. No studies examined patient outcomes. No adverse events were reported with defibrillation in a pig model with AED pads in direct contact with a bra's underwire. No difference in time to pad placement or shock delivery was seen with bra removal in simulation. One simulation study reported female manikins were less likely to be completely de-robed, including bra removal, which was attributed to social norms, modesty, and lack of awareness.

Conclusion: Scant evidence is available on the need for bra removal and outcomes associated with AED application. Further research is needed to explore whether bra removal is imperative for AED pad placement and defibrillation.

Keywords: Bra, Pads, Defibrillation, Automated external defibrillator, Cardiac arrest, Adverse events, Patient outcomes

Introduction

Emerging evidence indicates females experiencing cardiac arrest are less likely to receive cardiopulmonary resuscitation (CPR) and defibrillation from bystanders.[1–7] A public survey suggests this disparity may stem from public apprehensions about exposing and touching a woman's chest and fears of potential accusations of assault.[8] Such evidence highlights the urgent need to address sex-based differences in bystander intervention,[9] including the need to expose a woman's chest.

While CPR can be conducted over clothes, some exposure of the chest is required to ensure good adherence and correct placement of automated external defibrillator (AED) pads which are critical for successful defibrillation.[10] Major resuscitation guidelines differ in the details regarding chest exposure during pad placement, from removal of all clothes to application to the bare or exposed chest (Table 1).[11–14] Some AED suppliers[15] and first aid organisations[16] further caution against contact with metal, such as bra underwires, due to potential failure of the AED and risks to patients or rescuers. While adverse events from defibrillation are rare,[17] a case study reports burns to clothing and breasts in a female who self-

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Table 1 – Examples of resuscitation guidelines recommendations regarding removing clothing or exposing chest.

American Heart Association 2020 Guidelines[11]	Before pad placement, remove all clothing and jewelry from the chest
European Resuscitation Council 2021 Guidelines[12]	Attach the electrode pads to the victim's bare chest according to the position shown on the AED or on the pads
Australian and New Zealand Committee on Resuscitation Guidelines (January 2025)[13]	Place pads on the exposed chest in an anterior-lateral position
Resuscitation Council UK 2021 Guidelines[14]	Attach the electrode pads to the person's (who has sustained cardiac arrest) bare chest according to the position shown on the AED or on the pads

defibrillated over clothing, although this was performed with paddles with no mention of whether she was wearing a bra.[18].

Given the evidence on sex-based differences in bystander response, examining the evidence on whether bra removal is imperative for effective and safe AED pad placement and defibrillation was prioritised for review by the International Liaison Committee on Resuscitation (ILCOR) Basic Life Support Task Force. As it was unclear what literature is available on this subject, a scoping review was conducted to map the existing research and identify knowledge gaps. We aimed to investigate the breadth of literature on adverse events and patient outcomes associated with AED pad placement and defibrillation with or without a patient's bra in the setting of cardiac arrest.

Methods

Study design

This scoping review was conducted using the methodological framework by the Joanna Briggs Institute[19] and followed the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR Checklist provided in Supplement A).[20]

The scoping review complied with a prespecified plan written by members of the Basic Life Support Task Force of the ILCOR (Supplement B).

Eligibility criteria

The research question (Table 2) was: In adults and children in cardiac arrest (population), what are the adverse events and outcomes are associated with pad placement and/or defibrillation without removing the patient's bra/brassiere (including those with metal components) (concept) in any setting (in-hospital or out-of-hospital) (context). However, due to the limited literature identified during a preliminary search, broad eligibility criteria were adopted, and all reported outcomes were considered.

Only studies involving external defibrillation were included, and these studies were required to specify whether bra removal occurred. Publications in any language were eligible if an English abstract was available, and all study designs, except public opinion surveys, were included.

Information sources and search

To identify eligible studies, we developed a search strategy with key search terms and a selection of databases guided by an experienced information specialist. Keywords included in the search were bra, undergarment, underwire, bra removal, bare chest, undress, defibrillation, and AED (Medline search is available in Supplement C, the full search strategy is available from authors). On September 26, 2024, the search was run in Medline, Embase, and Cochrane databases. Grey literature was searched (first 20 pages of Google and Google Scholar) on October 1, 2024. Reference lists of included studies were reviewed to detect missed studies. We contacted authors of abstracts if no full text was identified in the searched databases to ascertain whether a manuscript was published.

Selection of sources of evidence

Covidence software[21] was applied in the screening of studies. Two reviewers (JEB and ASN) screened and evaluated studies by title and abstract, and eventually, full text to identify relevant studies for inclusion. The studies were screened against the eligibility criteria. Discrepancies in the screening and inclusion of potential studies were resolved by discussion.

Data charting process, data items, and synthesis of results

Data charting and synthesis followed the recommendations of the Joanna Briggs Institute,[19] and was performed and checked by two reviewers (JEB and ASN). The following data was extracted in a standardised form from the included studies: author, year of publica-

Table 2 – The scoping review inclusion criteria.

Population: Adults and children in cardiac arrest
Concept: Adverse events and outcomes associated with pad placement and/or defibrillation without removing the patient's bra/brassiere (including those with metal components)
Context: In patients wearing a bra/brassiere in any setting (in-hospital or out-of-hospital)
Study Designs: All relevant publications in any language will be included as long as there is an English abstract. Animal studies and case series and industrial reports will be included if no clinical evidence is found. Conference abstracts will be included if there is a lack of full text studies.
Timeframe: Databases searched from inception to September 26, 2024. Grey literature searched October 1st 2024.

tion, country of origin, publication type, study design, study population, intervention, and key findings relevant to the review objectives.

Results

Selection of sources of evidence

In total, 287 citations were identified from the literature search of electronic databases (Fig. 1). Of these citations, 2 were duplicates, and 274 were excluded based on the title and abstract. A total of 11 full texts were retrieved and assessed for eligibility. Of these, 8 citations were excluded due to wrong intervention (i.e. did not include bra removal, *n* = 7) and wrong study design (*n* = 1). The remaining three studies met the inclusion criteria of this scoping review and were eligible for data extraction.[22–24] No citations were identified through Google, Google Scholar, or from the reference lists of the included studies.

Characteristics of the included studies

A description of the three included studies is provided in Table 3. The studies originated from the United Kingdom (*n* = 2) and Canada (*n* = 1), with publication years of 2014 (*n* = 1) and 2015 (*n* = 2). Only one study was published in full and peer-reviewed.[23] The two remaining studies were conference abstracts conducted by authors from the same research group.[22,24] Some authors of the two conference abstracts were employed by a company that develops and manufactures AEDs. We received no response from these authors regarding the full published results. The study designs included two simulation manikin studies[23,24] and one animal[22] study.

The study's characteristics are detailed in Table 1. In the animal study, ventricular defibrillation was induced in a porcine model with delivery of a total of 126 shocks.The animal study examined adverse events associated with shock delivery with the AED pads in direct contact with the exposed metal underwire of a bra.[22] In the simulation study by O'Hare et al.,[24] untrained AED users were guided by an AED voice prompt to deliver a defibrillation to a manikin that was either "male" or "female", place the AED pads, and deliver a shock. Both manikins were clothed in a front-opening hooded sweater with a bra on the female manikin, but it was unclear whether the AED instructed bra removal and what was provided to aid the removal of clothing. In the other simulation study, by Kramer et al.,[23] undergraduate students performed resuscitation in an out-of-hospital cardiac arrest scenario on either a male or female manikin. The female manikin wore a wig, make-up, silicone breasts, a front-opening bra, and colour-coordinated women's clothing. Guided by an AED voice prompt, female and male participants were assigned to perform resuscitation on the female manikin, including CPR, AED pad placement, and shock delivery. Subsequently, the partici-

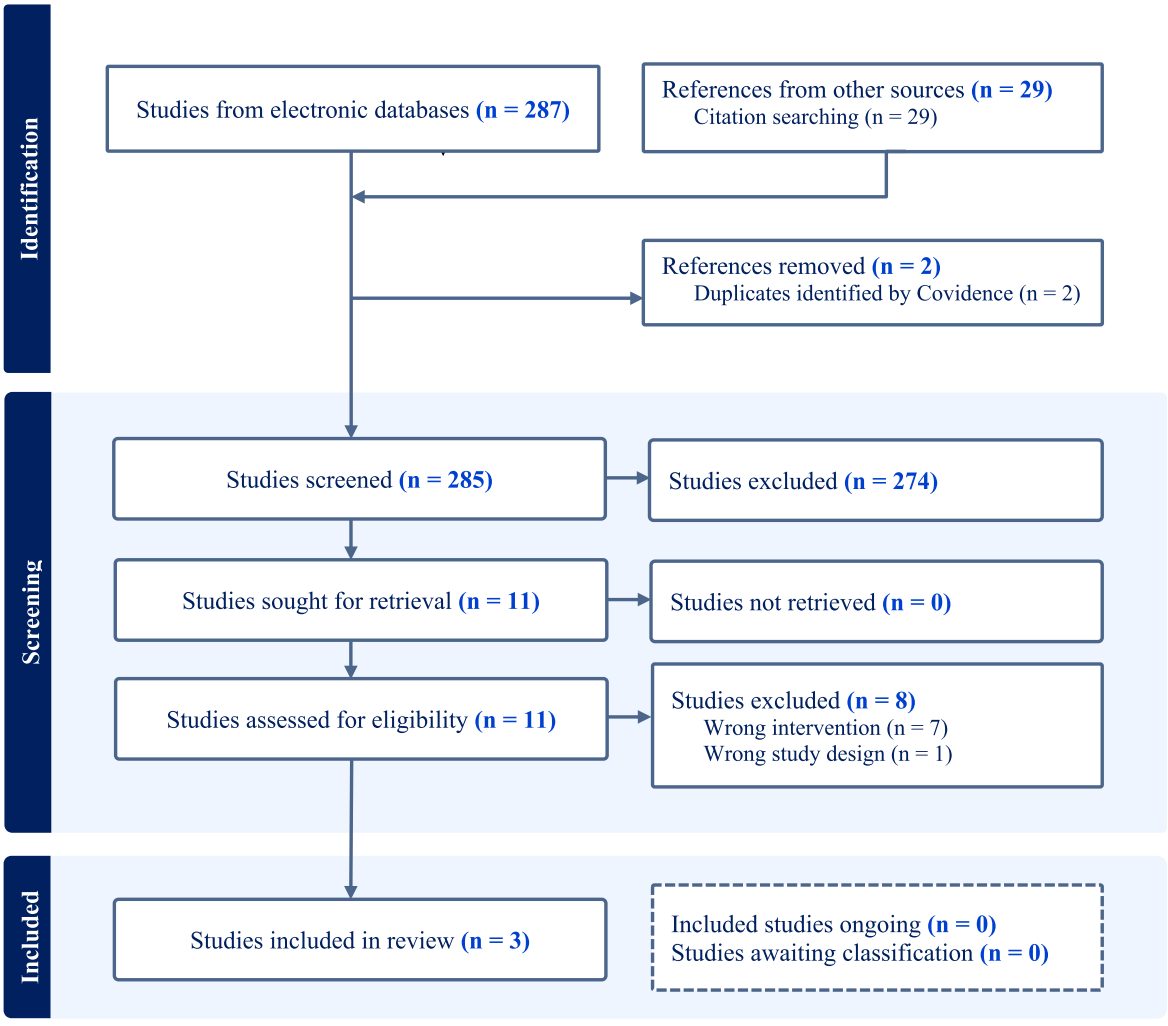

Fig. 1 – The PRISMA Flow chart.

Table 3 – Study characteristics.

Study details	Country	Study design Publication type	Population	Intervention	Key findings related to the review question
Di Maio 2015	United Kingdom	Animal study Porcine model with induction of arrhythmia and defibrillation by an AED Conference abstract	4 pigs	AED pads in direct contact with the metal wires of a bra placed on the pig Induction of ventricular fibrillation Defibrillation with 126 shocks (each 200 J) in total	No scorching or burning of the bra or skin Poor pad placement did not pose a risk to the operator (risk type not specified) No arcing No redirection of the current 100% first shock success (no instances of re-fibrillation)
Kramer 2015	Canada	Simulation study Simulation of out-of-hospital cardiac arrest scenario with CPR and AED use on patient simulators as either male or female (use of a wig, make-up, silicone breasts, front-opening brassiere, color-coordinated women's clothing). Video and audio recorded. Peer-reviewed article	69 randomly assigned undergraduate students: 31 male rescuers (16 vs 15 performed resuscitation on a male vs female patient simulator) 38 female rescuers (20 vs 18 performed resuscitation on a male and female patient simulator)	Voice prompt AED guidance on opening the case, activating AED, positioning of pads, shock delivery, administering CPR Structured interview about the experience related to removal of clothes and resuscitation	Female patient simulators less likely to be completely de-robed than the male patient simulators (42.4% vs 91.7%, $p < 0.001$) Male rescuers less likely to completely de-robe the female patient simulator than female rescuers (13.3% vs 66.7%, $p = 0.002$) Participants' thoughts on removal of clothes: • thought they needed only to remove enough clothing to place the defibrillator pads according to instructions rather than ensuring the brassiere would not affect CPR • social norms • concerned for patient modesty • men did not want to remove more clothing than necessary
O'Hare 2014	United Kingdom	Simulation study Resuscitation with AED use on manikins as either "female" (clothed in a front-opening hooded sweater with a bra) or "male" (no bra) Conference abstract	78 randomly selected untrained AED users 50% of the participants met a "female" manikin, while the other half met a "male" manikin	Removal of clothes (including bra) from the manikin guided by the AED voice prompt Placement of AED pads Delivery of a shock	Time to place electrodes: • 52 vs 49 s for female vs male manikinTime to first shock: • 79.5 vs 77 s for female vs male manikin (no statistically significant difference)88.5% of the participants correctly placed the electrodes and delivered a shock (sex of manikin not specified)

pants were interviewed about their thoughts on removing the patient's clothes.

Patient outcomes

No study examined patient outcomes.

AED pad placement

In a simulation study, the addition of bra removal on the time to pad placement was minimal and described as not statistically different (52 vs 49 s for the female vs male manikin); although the type of bra and the method used to remove the bra was not detailed in the conference abstract by O'Hare et al.[24]

In the simulation study by Kramer et al.[23], participants were less likely to completely de-robe the female manikin when compared with the male manikin (42.4% vs 91.7%, $p < 0.001$). Further, male participants were less likely to completely de-robe the female manikin when compared with female participants (13.3% vs 66.7%, $p = 0.002$). Reticence to remove clothing was revealed in structured interviews. This included a lack of awareness of the need to remove the bra, concerns about the theoretical patient's modesty, and social

norms. Further, male participants did not want to remove more clothing than necessary.

Delivery of shocks

A 100% first shock success with no instances of re-fibrillation was found in the animal study with 126 shocks.[22] Furthermore, no arcing or redirection of the current were observed.

Overall, 88.5% of the participants correctly placed the electrodes and delivered a shock on the manikin, although this data was not presented separately by the sex of the manikin and the sex of the participant.[24] There was no significant difference in the time to first shock between the female and male manikin simulations (79.5 vs 77 s, respectively).[24]

Safety

The animal study reported no scorching or burning of the skin with the delivery of 126 shocks of 200 J to the four pigs, and no adverse events to the operator were reported.[22]

Discussion

This scoping review explored the evidence surrounding bra removal and the outcomes associated with AED pad placement and defibrillation in the setting of cardiac arrest. We found limited evidence available, with only three studies identified,[22–24] including one animal and two simulation studies, of which two were conference abstracts. No adverse events were reported with 126 shocks delivered over an exposed underwire in a pig model.[22] Furthermore, no difference in time to pad placement or shock delivery was seen with the removal of a bra in a simulation study, although the method of removal was not detailed.[24] Sex differences were seen in simulations, with participants less likely to completely de-robe a female manikin, and this was attributed to societal reasons.[23]

Bra removal and adverse events

In the animal study, the AED pads were in direct contact with the metal-wired bra, though the exact position of the pads was not specified.[23] Notably, this study did not observe any adverse events to the pigs or the AED. However, the study was limited to being published as a conference abstract. These findings diverge from the general assumptions of the safe use of the AED by suppliers and training organisations,[15,16] whom assume that the direct contact between the AED pads and the metal-wired bra poses a risk of adverse events, such as burns, arcing, redirection of the current, and damage to the AED. To our knowledge, no prior experimental studies in humans have investigated the outcomes associated with AED pads in direct contact with a metal-wired bra and defibrillation. Hence, research is needed to establish the risk of adverse events and patient outcomes when leaving the bra on for AED application.

Sex-specific disparities in resuscitation

Routine bra removal may compromise timely defibrillation, particularly in bystander situations. Yet, leaving the bra on could result in inaccurate AED pad placement. In the simulation study by Kramer et al.,[23] some participants decided not to remove all the clothes during resuscitation, including the bra, which was attributed to social norms, concerns for patient modesty, and unawareness. Leaving the clothes on was particularly seen in the resuscitation of the female manikin. Similarly, a public survey from the United States of 548 males and females suggested sex-specific barriers in resuscitation, including exposing the women's breasts and inappropriate touching.[8] A growing body of evidence has already emphasized the sex disparity in resuscitation,[1–7] but the underlying factors are still to be investigated. However, the findings of this simulation study add to the knowledge regarding the social and cultural barriers that contribute to female patients being less likely to be resuscitated than male patients. Research on this topic is crucial, as bystander defibrillation is associated with the greatest survival of out-of-hospital cardiac arrest.[25]

Research gaps

In our search, few published studies addressed sex-specific aspects of resuscitation and removal of clothes. Data on patient outcomes is important to guide treatment strategies, especially in critical settings like cardiac arrest. Yet, we identified no studies that examined patient outcomes concerning bra removal for defibrillation. Studies targeting patient outcomes are particularly needed, as it is still unknown how not removing the bra for AED pad placement and defibrillation impacts the patient in cardiac arrest. Additionally, there is sparse knowledge of the adverse outcomes of the rescuer and the AED. Also, many modern bras do not have metal wires as examined in the included study with an animal model, but rather molded plastic underwires. These factors can be considered when conducting future studies. Moreover, the removal of clothes is time-consuming. The barriers to removing the clothes of female patients ought to be explored further, as limiting the time to treatment is crucial. As early defibrillation by bystanders is the single most efficacious intervention in out-of-hospital cardiac arrest,[26,27] anything that discourages this could potentially have significant impacts on survival.

Limitations

This scoping review has several limitations. We might have missed relevant studies in the screening process as our search was limited to studies with an English abstract. Additionally, our search of grey literature databases was limited to Google and Google Scholar. There may be industry publications (i.e., with AED companies) that are not in the public domain. As two of the three included studies were conference abstracts, comprehensive information on the methodology and findings of these studies was not available. Finally, this scoping review provides an overview of the breadth of the literature and should not be interpreted as a quality assessment of the existing evidence.

Conclusion

This scoping review highlights the lack of available data on bra removal for AED application in investigating patient outcomes and adverse events in the setting of cardiac arrest. The existing literature is sparse and includes only one animal study and two simulation manikin studies. Insufficient studies were identified to support completion of a systematic review. Further research is needed to explore whether bra removal is imperative for AED pad placement and defibrillation.

CRediT authorship contribution statement

Anne Storgaard Nørskov: Writing – original draft, Data curation. **Julie Considine:** Writing – review & editing, Conceptualization. **Ziad**

Nehme: Writing – review & editing, Conceptualization. **Theresa M. Olasveengen:** Writing – review & editing, Conceptualization. **Laurie J. Morrison:** Writing – review & editing, Conceptualization. **Peter Morley:** Writing – review & editing, Conceptualization. **Janet E. Bray:** Writing – review & editing, Writing – original draft, Supervision, Data curation, Conceptualization.

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Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: 'JB is an Associate Editor of Resuscitation Plus. PM, TMO, ZN are Resuscitation Plus Editorial Board Members.'.

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Non-author Task Force member Collaborators

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Appendix A. Supplementary material

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REFERENCES

1. Ahn KO, Shin SD, Hwang SS. Sex disparity in resuscitation efforts and outcomes in out-of-hospital cardiac arrest. *Am J Emerg Med* 2012;30:1810–6. https://doi.org/10.1016/j.ajem.2012.02.018.
2. Bray JE, Stub D, Bernard S, Smith K. Exploring gender differences and the "oestrogen effect" in an Australian out-of-hospital cardiac arrest population. *Resuscitation* 2013;84:957–63. https://doi.org/10.1016/j.resuscitation.2012.12.004.
3. Grunau B, Humphries K, Stenstrom R, et al. Public access defibrillators: gender-based inequities in access and application. *Resuscitation* 2020;150:17–22. https://doi.org/10.1016/j.resuscitation.2020.02.024.
4. Ishii M, Tsujita K, Seki T, et al. Sex- and age-based disparities in public access defibrillation, bystander cardiopulmonary resuscitation, and neurological outcome in cardiac arrest. *JAMA Netw Open* 2023;6:e2321783. https://doi.org/10.1001/jamanetworkopen.2023.21783.
5. Jadhav S, Gaddam S. Gender and location disparities in prehospital bystander AED usage. *Resuscitation* 2021;158:139–42. https://doi.org/10.1016/j.resuscitation.2020.11.006.
6. Kiyohara K, Katayama Y, Kitamura T, et al. Gender disparities in the application of public-access AED pads among OHCA patients in public locations. *Resuscitation* 2020;150:60–4. https://doi.org/10.1016/j.resuscitation.2020.02.038.
7. Souers A, Zuver C, Rodriguez A, Van Dillen C, Hunter C, Papa L. Bystander CPR occurrences in out of hospital cardiac arrest between sexes. *Resuscitation* 2021;166:1–6. https://doi.org/10.1016/j.resuscitation.2021.06.021.
8. Perman SM, Shelton SK, Knoepke C, et al. Public perceptions on why women receive less bystander cardiopulmonary resuscitation than men in out-of-hospital cardiac arrest. Circulation 2019;139:1060–8. https://doi.org/10.1161/CIRCULATIONAHA.118.037692.
9. Blewer AL, Bigham BL, Kaplan S, Del Rios M, Leary M. Gender, socioeconomic status, race, and ethnic disparities in bystander cardiopulmonary resuscitation and education—a scoping review. *Healthcare* 2024;12:456.
10. Foster AG, Deakin CD. Accuracy of instructional diagrams for automated external defibrillator pad positioning. *Resuscitation* 2019;139:282–8. https://doi.org/10.1016/j.resuscitation.2019.04.034.
11. Panchal AR, Bartos JA, Cabanas JG, et al. Part 3: Adult basic and advanced life support: 2020 American Heart Association guidelines for cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation* 2020;142:S366–468. https://doi.org/10.1161/CIR.0000000000000916.
12. Olasveengen TM, Semeraro F, Ristagno G, et al. European Resuscitation Council guidelines 2021: basic life support. *Resuscitation* 2021;161:98–114. https://doi.org/10.1016/j.resuscitation.2021.02.009.

13. Australian and New Zealand Committee on Resuscitation. Guideline 7 – automated external defibrillation in basic life support. https://www.anzcor.org/.
14. Resusciation Council UK. Adult basic life support guidelines 2021. https://www.resus.org.uk/library/2021-resuscitation-guidelines. Accessed 25/01/2025.
15. Defib Supplies. Defibrillating women: breaking the barrier – a collaboration between Defib supplies and bra off, Defib O. https://defibsupplies.co.uk/resources/defibrillating-women-breaking-the-barrier-a-collaboration-between-defib-supplies-and-bra-off-defib-on-2. Accessed 26/01/2025.
16. St John Ambulance Australia. Understanding the gender gap in cardiac response. https://stjohntas.org.au/news/2024/understanding-gender-gap-cardiac-response. Accessed 25/01/2025.
17. Hoke RS, Heinroth K, Trappe H-J, Werdan K. Is external defibrillation an electric threat for bystanders?. *Resuscitation* 2009;80:395–401. https://doi.org/10.1016/j.resuscitation.2009.01.002.
18. Montauk L. Lethal defibrillator Mishap. *Ann Emerg Med* 1997;29:825. https://doi.org/10.1016/S0196-0644(97)70211-7.
19. Peters MD, Godfrey CM, Khalil H, McInerney P, Parker D, Soares CB. Guidance for conducting systematic scoping reviews. *Int J Evid Based Healthc* 2015;13:141–6. https://doi.org/10.1097/XEB.0000000000000050.
20. Tricco AC, Lillie E, Zarin W, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med* 2018;169:467–73. https://doi.org/10.7326/M18-0850.
21. Covidence. https://www.covidence.org/. Accessed 07/11/2024.
22. Di Maio R, O'Hare P, Crawford P, McIntyre A, McCanny P, Torney H, Adgey J. Self-adhesive electrodes do not cause burning, arcing or reduced shock efficacy when placed on metal items. *Resuscitation* 2015;96:11. https://doi.org/10.1016/j.resuscitation.2015.09.026.
23. Kramer CE, Wilkins MS, Davies JM, Caird JK, Hallihan GM. Does the sex of a simulated patient affect CPR?. *Resuscitation* 2015;86:82–7. https://doi.org/10.1016/j.resuscitation.2014.10.016.
24. O'Hare P, Di Maio R, McCanny P, McIntyre C, Torney H, Adgey J. Public access defibrillator use by untrained bystanders: Does patient gender affect the time to first shock during resuscitation attempts?. *Resuscitation* 2014;85:S49. https://doi.org/10.1016/j.resuscitation.2014.03.124.
25. Weisfeldt ML, Sitlani CM, Ornato JP, et al. Survival after application of automatic external defibrillators before arrival of the emergency medical system: evaluation in the resuscitation outcomes consortium population of 21 million. *J Am Coll Cardiol* 2010;55:1713–20. https://doi.org/10.1016/j.jacc.2009.11.077.
26. Baekgaard JS, Viereck S, Moller TP, Ersboll AK, Lippert F, Folke F. The effects of public access defibrillation on survival after out-of-hospital cardiac arrest: a systematic review of observational studies. *Circulation* 2017;136:954–65. https://doi.org/10.1161/CIRCULATIONAHA.117.029067.
27. Brooks SC, Clegg GR, Bray J, et al. Optimizing outcomes after out-of-hospital cardiac arrest with innovative approaches to public-access defibrillation: a scientific statement from the International Liaison Committee on Resuscitation. *Resuscitation* 2022;172:204–28. https://doi.org/10.1016/j.resuscitation.2021.11.032.