

PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	What are the barriers to implementation of cardiopulmonary resuscitation training in secondary schools? A qualitative study
AUTHORS	Zinckernagel, Line; Malta Hansen, Carolina; Hulvej Rod, Morten; Folke, Fredrik; Torp-Pedersen, Christian; Tjørnhøj-Thomsen, Tine

VERSION 1 - REVIEW

REVIEWER	Mark Edwards University of Bristol, UK
REVIEW RETURNED	27-Nov-2015

GENERAL COMMENTS	<p>This is a well written and succinct paper. The objectives are few and addressable and the paper does a good job of exploring these issues. I think a great deal more depth is required in terms of the qualitative data. Only a handful of quotes are used throughout. Please add more quotes and clarify that they are coming from different sources.</p> <p>I do not like the use of the word 'principal' for people who are not actually principals and I think this should be changed. I also think more depth is needed throughout the paper (see comments). There are some questions over consent and participants that I would like to see greater details on. Whilst there are quite a lot of edits, I do think they are minor and hopefully you have the data to ensure they are met.</p> <p>Abstract:</p> <p>Line 16: put ns after interview and focus group</p> <p>Line 18: Put brief details on what the interviews/FGs sought to achieve</p> <p>Line 30: don't use 'etc'. Include the other variables or delete 'etc'.</p> <p>Line 37: Who are 'they'? Be specific.</p> <p>Line 43 change 'insecurity about own CPR' to 'insecurity about their own'</p> <p>Introduction:</p> <p>These could do with more depth. Give an example of what CPR training usually consists of. How much does it cost? You say 'low rates of implementation' have been observed. What does this equate to? What age group is the training usually taught to in</p>
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	<p>schools?</p> <p>Page 4, line 51: use 'eight' rather than '8'</p> <p>Methods:</p> <p>Page 6, Line 30, give definition of what you used for 'near' and 'far' from hospitals.</p> <p>I am not comfortable with your use of the word principal to refer to people who are not actually principals. Would not senior leadership (or similar) be more accurate? Only 5 of the 9 people referred to as principal are actually principals, so I think it is currently misleading.</p> <p>On line 32 please provide reference to Table 1 (so people can see how many were principals and how many not).</p> <p>Page 6, Line 34: You wanted 4-8 teachers in each school (between 32-64 overall). What was the reason for only having 16 teachers in the end? Can you please add detail as to why you only got this number? Was this in any way a reflection of the importance/or not that schools gave to CPR training?</p> <p>Page 6, line 40: Please provide detail (if you have it) on the subject area of the teachers you spoke with.</p> <p>Data collection:</p> <p>Page 7, Line 36: The first few sentences are hard to follow. Please can you restructure so it is clearer (use ns). What was the mean n of participants in focus groups?</p> <p>Please include interview and focus groups guides as supplementary material and make reference to this in the data collection paragraph.</p> <p>Page 8, first paragraph: How was conflict between researchers dealt with? Did the research group read over the transcripts or just codes? A bit more depth on the frequency and number of meetings would be nice.</p> <p>Ethics:</p> <p>Page 8: Please provide more detail: was written informed consent received from all participants? Were interviews recorded and please include details of who conducted the transcription here (not just at the end of the article). Were interviews transcribed verbatim?</p> <p>Results:</p> <p>Page 9, line 7: define what systematically means in this context. It doesn't make sense. Does it mean, year-on-year/continuously?</p> <p>Line 23-27: I and II are not easy to differentiate (please provide more detail in brackets after 'instruction' and 'skills'.</p> <p>Results: Throughout this section please provide more quotes. I would expect to see at least two quotes for each of the claims you are making. Please add more throughout.</p>
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	<p>Page 10, Line 34-40: Please provide quote as evidence for this point.</p> <p>Page 10, Line 47: Delete 'who attended a CPR course¹ half years ago' as it is not consistent with all other citations. Please provide a school ID (i.e., 1,2,3) after each teacher/principal quote, as from the readers perspective it is not clear if it is just a couple of people providing the quotes or if they are coming from a range of people.</p> <p>Page 10, line 50: Change 'some even argued' to 'some respondents argued that'</p> <p>Page 11, line 18-22: put a 1) 2) 3) before the three aspects, as it does not make sense when you see the (1), (2), (3) below as it currently stands – it is difficult to establish what they relate to.</p> <p>Page 12, line 37-43: Provide quotes to back up the assertions.</p> <p>Page 13, line 6: use apostrophes on principals and teachers.</p> <p>Page 13, line 18-30: Need quotes to back up these claims.</p> <p>Discussion:</p> <p>Page 14, line 10: change 'barriers needed to address' to 'barriers that need to be addressed'</p> <p>Line 18: who are 'they'?</p> <p>Line 22: change 'insecurity about own' to 'insecurity about their own'.</p> <p>Line 32 change 'gain in-depth' to 'gain an in-depth'</p> <p>Page 15, line 9: I think the subtitle is unnecessary. Consider deleting. I would include this as part of the discussion and move the strengths and limitations afterwards.</p> <p>Page 16, line 25: add comma after 'Also'</p> <p>Line 27 apostrophes after principals and teachers</p> <p>Line 31: put comma after 'required'</p> <p>Page 17, line 4 and 31: change 'with own' to 'with their own'</p> <p>Page 18, line 8: delete repetition of 'they had no influence...'</p>
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REVIEWER	A Blewer University of Pennsylvania, USA
REVIEW RETURNED	08-Dec-2015

GENERAL COMMENTS	<p>Thank you for the opportunity to review this manuscript.</p> <p>The associated manuscript by Zinckernagel et al explores the barriers to implementing CPR training in secondary schools – an important area of investigation from a public policy and implementation standpoint. While the investigation is warranted, the</p>
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	<p>manuscript may benefit from edits detailed below. We hope these suggestions are helpful to the authors:</p> <p>Introduction</p> <p>1) The manuscript could benefit from framing the argument and providing more detail on the reason for the problem – see questions assumed and not clarified in the introduction:</p> <p>a) What is the benefit to schools adhering to the mandate of providing CPR instruction in their school?</p> <p>b) What are the repercussions for not adhering to this legislation?</p> <p>c) Are the administrators aware of the benefits or repercussions, if any?</p> <p>d) What are the resources provided by the government to facilitate enacting the legislation? For example, is funding provided for training material? Are the administrators given guidance on curriculum?</p> <p>These items could be touched upon in the introduction to help frame the argument.</p> <p>Methods</p> <p>2) Clarification on whether the following questions were asked of the administrators/teacher or whether this is uniform across all schools:</p> <p>a) What grade is the CPR course required to be taught by?</p> <p>b) Who is required to teach the course? (in your school)</p> <p>c) Would the teaching take place in health class or would it be integrated into a core class?</p> <p>3) Clarification on whether the interview vs the focus groups differed. Was there a different script for each method?</p> <p>4) Was the thematic analysis guided by any particular qualitative theory? (ie- grounded theory)</p> <p>5) Please describe the transcription and coding process in more detail, specifically:</p> <p>a) Were the interviews audiorecorded?</p> <p>b) Who transcribed the interviews?</p> <p>c) How were the data stored?</p> <p>d) Were analytical tools used for the coding process? If so, please describe</p> <p>6) Clarification of the duration of the study (eg: Feb 2012 – May 2012)</p> <p>Results</p> <p>7) Line 7, page 9 – what do you mean by currently vs systematically taught?</p> <p>8) Section related to insecurity of ones own instruction – is this in regards to teachers and facilitators using a CPR Anytime kit? Or a BLS class? This section could benefit by providing a bit more context</p> <p>Discussion</p> <p>9) Line 34, page 13 – “Further, many did not know CPR kits were available free of charge”. This seems like an important message to highlight.</p> <p>10) Are teachers aware of hands-only CPR and the simplified skills requirement for lay bystanders?</p> <p>MINOR EDITS:</p> <p>Abstract</p> <p>Line 21, page 2 – remove a and of to read “....strategic sampling to</p>
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	<p>reach maximum variation” Line 30, page 2 – remove “....,etc”</p> <p>Article Summary Line 10, page 3: add an”gain AN in-depth, nuanced” Line 14, page 3: add ship “...relationSHIP” Line 16, page 3: AN understand</p> <p>Results Line 7-17, page 9: second sentence was confusing. Please clarify</p> <p>If possible, it may be beneficial to provide a copy of the semi-structured interview questionnaire as a supplemental file.</p>
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VERSION 1 – AUTHOR RESPONSE

Reviewer: 1

Mark Edwards
University of Bristol, UK

1) We are thankful for these valuable observations and comments. Below we have addressed every comment separately. We hope you will find our reply and changes to the manuscript satisfactory. This is a well written and succinct paper. The objectives are few and addressable and the paper does a good job of exploring these issues. I think a great deal more depth is required in terms of the qualitative data. Only a handful of quotes are used throughout. Please add more quotes and clarify that they are coming from different sources.

REPLY: This is a very important comment. We agree that more qualitative data (quotes) would indeed improve the argument in the manuscript. We have added 6 quotes to the manuscript and clarified which sources they are coming from. We would be happy to add more quotes if the reviewer or editors do not find this satisfactory.

2) I do not like the use of the word 'principal' for people who are not actually principals and I think this should be changed.

REPLY: We agree that this word is confusing and does not capture the range of school leadership included. Instead we will use the term 'school leadership' when referring to principals, administrative managers and section managers throughout the paper. This has been clarified in the method section 'Sampling and participants' (see below).

3) I also think more depth is needed throughout the paper (see comments). There are some questions over consent and participants that I would like to see greater details on. Whilst there are quite a lot of edits, I do think they are minor and hopefully you have the data to ensure they are met.

REPLY: Thank you for pointing this out. We agree that more information about consent and participants would provide more transparency about the methods and procedures used, which is certainly important. Greater details have been integrated in the method sections 'sampling and participants' and 'ethics'.

Sampling and participants

We asked principals to participate in the study through a telephone call, but they could delegate participation to a middle manager (e.g. administrative managers and section managers), if relevant according to their area of responsibility. Principals and middle managers are all referred to as school

leadership. Teachers were recruited only at schools with participating school leadership. School leadership were asked to give access to between four and eight secondary school teachers.

Ethics

Verbal consent was obtained from all individual persons participating in the study. All participants were informed about the aim of the study and were assured that participation was voluntary, results would be anonymous, that we had no intention of evaluating any specific school, school leader, or teacher, and that refusal of participation would be without any consequences. Only persons attached to the research team had access to the data, and full names of the participants were kept separated from the transcripts. The study was approved by the Danish Data Protection Agency J.nr. 2012-54-0217 for safe handling and storing of data. In Denmark this type of study does not require formal ethical approval hereunder written consent.[1]

Reference

1) The Danish Data Protection Agency. Danish Act on Processing of Personal Data. 2015. <http://www.datatilsynet.dk/lovgivning/persondataloven>. (accessed 04 Jan 2016)

Reviewer: 2

Audrey Blewer
University of Pennsylvania, USA

Thank you for these important and valuable comments. Below we have addressed every comment separately. We hope you will find our reply and changes to the manuscript satisfactory.

The associated manuscript by Zinckernagel et al explores the barriers to implementing CPR training in secondary schools – an important area of investigation from a public policy and implementation standpoint. While the investigation is warranted, the manuscript may benefit from edits detailed below. We hope these suggestions are helpful to the authors.

Introduction

- 1) The manuscript could benefit from framing the argument and providing more detail on the reason for the problem – see questions assumed and not clarified in the introduction:
 - a) What is the benefit to schools adhering to the mandate of providing CPR instruction in their school?
 - b) What are the repercussions for not adhering to this legislation?
 - c) Are the administrators aware of the benefits or repercussions, if any?
 - d) What are the resources provided by the government to facilitate enacting the legislation? For example, is funding provided for training material? Are the administrators given guidance on curriculum?

These items could be touched upon in the introduction to help frame the argument.

REPLY: We agree that more contextual information as suggested would improve the framing of the argument. Below, we have addressed questions 1a-1d separately. Most of this information has been integrated into the introduction section in the manuscript.

- a) The school do not receive any financial benefits for adhering to the mandate of providing CPR training in their school. Average grades at school level for core subjects such as math and biology are made publicly available by the Ministry of Education, creating an incentive to improve on these parameters. No such incentives exist for CPR training. However, school staff recognizes the benefits of increased survival of OHCA, that it will help students deal with emergencies, and increase their self-esteem. [1]

b) There are no formally approved repercussions for not adhering to the legislation on CPR training. Nevertheless, it is the responsibility of the school leadership to implement the state law e.g. to ensure that teachers take on their responsibility of organizing CPR training of students.[2,3]

c) The schools are aware that the benefits and repercussions for the school regarding subjects such as CPR training are few. A mandate of this nature stresses the need to overcome other barriers to CPR training. Otherwise, unsuccessful implementation may be expected.

d) The Danish legislation suggests a graded program, where CPR training should be conducted in 7th to 9th grade. Prior to 7th grade, the training should include calling for help, provide comfort and care at both small daily incidents and more serious accidents, and place the unconscious person in the recovery position.[2,3] As in many other countries, no guidance is provided regarding who should train the students (external instructor, biology teacher, homeroom teacher etc.), required trainer proficiency level, training material, training time, which part of the school curriculum CPR training should be integrated in or the source of funding e.g. for training material or for teachers training. The importance of a framework providing such guidance has been underscored, because it will help schools to coordinate, plan and implement CPR training.[3]

References

- 1) Miro O, Jimenez-Fabrega X, Espigol G et al Teaching basic life support to 12-16 year olds in Barcelona schools: views of head teachers. *Resuscitation* 2006;70(1):107-116.
- 2) Undervisningsministeriet. Fælles Mål 2009 Færdselslære. Faghæfte 20. Undervisningsministeriets håndbogsserie. 2009.
- 3) Undervisningsministeriet. Bekendtgørelse om formål, trin- og slutmål for folkeskolens fag og emner BEK nr 748 af 13/07/2009. 2009. <https://www.retsinformation.dk/forms/R0710.aspx?id=125973> (accessed 04 Jan 2016)
- 4) Plant N, Taylor K How best to teach CPR to schoolchildren: a systematic review. *Resuscitation* 2013;84(4):415-421.

Methods

- 2) Clarification on whether the following questions were asked of the administrators/teacher or whether this is uniform across all schools:
- a) What grade is the CPR course required to be taught by?
 - b) Who is required to teach the course? (in your school)
 - c) Would the teaching take place in health class or would it be integrated into a core class?

REPLY: The three above mentioned questions were asked at schools, at which CPR training of students took place along with other questions regarding organization. At both schools with and without CPR training, we asked how they preferred the training to be organized and why, including questions regarding what grade, who should conduct the training, and how the teaching should take place (e.g. health class or into a core class).

The semi-structured interview protocol has been provided as a supplemental file to show this.

Results about current organization and preferred organization of CPR training of students are very limited in this manuscript. We have chosen to narrow the scope of the manuscript in order to be able to provide in-depth information about key barriers to implementation of the training. We acknowledge this in the paper and invite research on this.

- 3) Clarification on whether the interview vs the focus groups differed. Was there a different script for each method?

REPLY: We agree that this requires further explanation. We have therefore added the following information to the method section 'Data collection'.

School leadership and teachers were interviewed separately due to the power imbalance between them. Individual interviews with school leadership were chosen due to logistical considerations. Further, they are well suited for sensitive topics,[1,2] which admitting not having implemented mandatory CPR training may be. Focus group interviews with teachers were preferred, because they elucidate different positions and uncover the degree of consensus or diversity on a topic. Participants can present their own views and comment on others, responses can be compared, and positions can evolve in the interaction during the interview.[1,2]

The interview protocol used for school leadership and teachers only differed marginally.

References

- (1) Mason J. Qualitative Researching. London: Sage Publication, 2007.
- (2) Patton M. Qualitative Research & Evaluation Methods. London: Sage, 2002.

4) Was the thematic analysis guided by any particular qualitative theory? (ie- grounded theory)

REPLY: We acknowledge that more information on the analysis would be helpful. We have therefore edited the method section 'Data analysis'.

The analysis, taking an inductive descriptive approach, was data-driven and guided by conventional thematic analysis strategies identifying regular patterns of meaning both within and across the interviews, thus allowing us to specify major themes in the material.[1,2] The transcripts were read repeatedly by the two primary investigators (LZ, CMH) to get an overall impression and become familiar with the diversity of the data. They separately used open coding for each paragraph of the transcriptions to discover categories, characteristics, and dimensions in the material, [24] and met to discuss and refine the categories. The coding was then discussed with the research team (LZ, CMH, TTT, MHR), and related categories were reduced to form major themes with subcategories.

References

- (1) Mason J. Qualitative Researching. London: Sage Publication, 2007.
- (2) Patton M. Qualitative Research & Evaluation Methods. London: Sage, 2002.

5) Please describe the transcription and coding process in more detail, specifically:

- a) Were the interviews audiorecorded?
- b) Who transcribed the interviews?
- c) How were the data stored?
- d) Were analytical tools used for the coding process? If so, please describe.

REPLY: Yes, this should be specified. We have integrated the following information in the method section in the manuscript.

- a) All interviews were audio-recorded.
- b) All interviews were transcribed by the first author (LZ).
- c) Only persons attached to the research team had access to the data, and full names of the participants were kept separated from the transcripts.
- d) Each interview was coded (LZ) applying a colour for each theme in Microsoft word. Each colour/theme was transferred to another document and colour divided into subthemes.

6) Clarification of the duration of the study (eg: Feb 2012 – May 2012)

REPLY: The interviews were conducted during November 2012 to January 2013. This information has been added to the manuscript.

Results

7) Line 7, page 9 – what do you mean by currently vs systematically taught?

REPLY: We agree that this is confusing.

Four schools were currently teaching students in CPR. However, only one of these schools was providing CPR training systematically and ensuring all students were trained in CPR before graduating secondary school. At the three other schools CPR training seemed to be unorganized, irregular and coincidental. This has been clarified in the manuscript.

8) Section related to insecurity of ones own instruction – is this in regards to teachers and facilitators using a CPR Anytime kit? Or a BLS class? This section could benefit by providing a bit more context

REPLY: This comment made us realize, it was unclear how many of the teachers who had actual experience of conducting CPR training of students, and which kind of training. We have therefore added the following to the method section 'Sampling and participants' as background knowledge to the result section.

Only three out of 16 teachers had conducted CPR training of students using a CPR training kit including a video-based self-instruction. One of the teachers, who were a certified instructor, had also provided a full week basic life support training to students without using such a kit. Another three teachers and one school leader had observed CPR training of students.

Discussion

9) Line 34, page 13 – “Further, many did not know CPR kits were available free of charge”. This seems like an important message to highlight.

REPLY: We agree that this message should be highlighted. We have added the following sentences in the discussion section.

Previous studies have identified training material as important for implementation of CPR training.[1,2] Our study indicates training kits including a video-based self-instruction have the potential to increase teachers' confidence in training students in CPR, as such kits seemed to lower their expectations of skill requirements. However, this was only expressed among those familiar with training kits. It is also problematic that many interviewees did not know such training kits were available to Danish schools free of charge. Several organizations offer different types of training material to schools and CPR courses for students and teachers in a varying price range. There is no overview of this to schools.

References

- 1) Lafferty C, Larsen PD, Galletly D Resuscitation teaching in New Zealand schools. N Z Med J 2003;116(1181):U582.
- 2) Lockett AS, Barton K, Yoxall H Opportunities and barriers to cardiopulmonary resuscitation training in English secondary schools. Eur J Emerg Med 2015.

10) Are teachers aware of hands-only CPR and the simplified skills requirement for lay bystanders?

REPLY: Thank you for asking this question. To clarify this, the following has been added to the

discussion section.

To simplify skill requirements for lay bystanders the American Heart Association and the European Resuscitation Council introduced compression-only (or hands-only) CPR in 2010 for untrained or not proficient bystanders under some circumstances.[1-4] The Danish Resuscitation Council has, however, not included compression-only in their guidelines.[5] Nevertheless, we found that awareness of frequently changing guidelines contributed to the interviewee's insecurity, thus compression-only CPR may not necessarily enable school leaders and teachers to feel competent.

References

- 1) Berg RA, Hemphill R, Abella BS et al Part 5: adult basic life support: 2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation* 2010;122(18 Suppl 3):S685-705.
- 2) Koster RW, Baubin MA, Bossaert LL et al European Resuscitation Council Guidelines for Resuscitation 2010 Section 2. Adult basic life support and use of automated external defibrillators. *Resuscitation* 2010;81(10):1277-1292.
- 3) Perkins GD, Handley AJ, Koster RW et al European Resuscitation Council Guidelines for Resuscitation 2015: Section 2. Adult basic life support and automated external defibrillation. *Resuscitation* 2015;95:81-99.
- 4) Travers AH, Perkins GD, Berg RA et al Part 3: Adult Basic Life Support and Automated External Defibrillation: 2015 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations. *Circulation* 2015;132(16 Suppl 1):S51-83.
- 5) Danish Resuscitation Council. <http://genoplivning.dk/> (accessed 07 Jan 2016).

MINOR EDITS:

Abstract

Line 21, page 2 – remove a and of to read “....strategic sampling to reach maximum variation”
Line 30, page 2 – remove “....,etc”

Article Summary

Line 10, page 3: add an”gain AN in-depth, nuanced”
Line 14, page 3: add ship “...relationSHIP”
Line 16, page 3: AN understand

REPLY: Thank you for pointing this out. We have improved the word order as recommended.

Results

Line 7-17, page 9: second sentence was confusing. Please clarify

REPLY: Thank you for pointing this out. We have clarified the following sentence.

“The four schools without CPR training did not correspond to the schools without knowledge of the legislation or to private schools (Table 2), to which the legislation does not fully apply, demonstrating that other barriers are important to implementation of CPR training.”

We have changed the sentence to:

Not all interviewees knew CPR training of students was mandatory. At the schools without CPR training, the school leader knew about the legislation. Further, only one of the schools without CPR training was a private school, to which the legislation does not fully apply (Table 2). This

demonstrates that other barriers, besides lack of knowledge about CPR legislation, is important to implementation of CPR training

If possible, it may be beneficial to provide a copy of the semi-structured interview questionnaire as a supplemental file.

REPLY: An English version of the semi-structured interview protocol has been provided as a supplemental file. As the interview protocols used for school leadership and teachers only differed marginally, we have only provided the guide used for interviewing the teachers.

VERSION 2 – REVIEW

REVIEWER	Mark Edwards University of Bristol, UK
REVIEW RETURNED	21-Jan-2016

GENERAL COMMENTS	All comments have been addressed sufficiently. I am happy for this paper to be published with no further (non-editorial) revisions.
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REVIEWER	Audrey Blewer University of Pennsylvania, Philadelphia, PA, USA I have a Mentored Clinical and Population Research grant from the American Heart Association related to cardiopulmonary resuscitation training.
REVIEW RETURNED	01-Feb-2016

GENERAL COMMENTS	The authors adequately addressed the concerns I raised in the previous review.
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