

## PEER REVIEW HISTORY

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## ARTICLE DETAILS

<b>TITLE (PROVISIONAL)</b>	Effect of large-scale disasters on bystander-initiated cardiopulmonary resuscitation in family-, friend-, and colleague-witnessed out-of-hospital cardiac arrest: a retrospective analysis of prospectively collected, nationwide, population-based data
<b>AUTHORS</b>	Ushimoto, Tomoyuki; Takada, Kohei; Yamashita, Akira; Morita, Hideki; Wato, Yukihiro; Inaba, Hideo

## VERSION 1 – REVIEW

<b>REVIEWER</b>	Jie Lim, Zheng Austin Health, Department of Anaesthesia
<b>REVIEW RETURNED</b>	28-Sep-2021

<b>GENERAL COMMENTS</b>	<p>Abstract</p> <ul style="list-style-type: none"><li>- Suggest mentioning "nuclear pollution" in the objective as well (already mentioned under exposure and conclusions).</li></ul> <p>Data analysis</p> <ul style="list-style-type: none"><li>- I would have been interested in knowing the long-term impacts of BCPR beyond just one year before and after the index incident. The beauty of this study is that longitudinal data might be available to show long-term trends. This will significantly elevate this paper, especially in the context of understanding the impact of disasters (tsunamis, earthquakes, COVID) on pre-hospital care.</li></ul> <p>Results</p> <ul style="list-style-type: none"><li>- The number of BCPRs should be mentioned in the results. The figures for tsunami-affected areas are available in figure 1 but no specific numbers are available for prefectures that were not affected by the tsunami.</li><li>- Last line of page 12 of 38 - Recommend reporting confidence interval or p-value to demonstrate the significance of this reduction.</li></ul> <p>Discussion</p> <ul style="list-style-type: none"><li>- Page 16 of 38 - first line - please provide a reference for the claim that BCPR is higher in Japan compared to EU and US.</li></ul> <p>Conclusions</p> <ul style="list-style-type: none"><li>- The authors correctly mention the importance of BLS training in the context of managing future disasters and major accidents in the conclusion. However, this is not elaborated in the discussion. I think this should be elaborated there, as it is an important point in public readiness.</li></ul> <p>Other comments</p> <ul style="list-style-type: none"><li>- Suggest a review of grammatical errors in the manuscript</li></ul>
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	<p>- E.g. page 18 of 38, "Third, no researches were conducted..."</p> <p>- Suggest reviewing references again please. There are some errors, e.g. Reference 12 is used on line 34 in page 17 of 38 to reference COVID-19 studies however the website the reference links to discusses the earthquake instead.</p>
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<b>REVIEWER</b>	Schmicker, Rob University of Washington, Seattle, Biostatistics
<b>REVIEW RETURNED</b>	19-Oct-2021

<b>GENERAL COMMENTS</b>	<p>This is an important analysis of bystander CPR rates following the Great East Japan Earthquake in 2011. The authors defined a 24-week impact period after the earthquake that corresponded to the continuation of aftershocks, search for missing people and reconstruction of towns. BCPR rates during this 24-week period in 2011 were compared to the same 24-week period in 2010 and 2020. Results suggested that BCPR rates were decreased during 2011 which is consistent with previous research suggesting that large scale pandemics decrease the amount of BLS actions in populations.</p> <p>I am happy to have been able to review. I thought the study was designed well and addresses an important issue. However, I found some terminology to be confusing and felt that the results were often out of order. I'd like to offer the following specific comments/recommendations:</p> <p>Overall comments</p> <p>--Page 2, Line 34: Cases with bystander CPR performed by others (N=33627) are excluded. If the idea is that pandemic and disasters make people more fearful to infection then wouldn't this group be of interest? Maybe I'm mistaken, but it seems to me that family and friends are more likely to provide BCPR than strangers. If so, then I would expect the results to amplified in this group?</p> <p>--Page 2, Line 53: Since most of the paper is on the impact phase following the earthquake, I wonder if it would be helpful to add another row to the consort diagram showing this?</p> <p>--Page 5: I would like to see brief statistical methods in the methods section of the abstract. Currently they are first mentioned in the results.</p> <p>--Page 5, Lines 49-55: This sentence feels more like one for conclusion than results. The next sentence in results provides the actual results.</p> <p>--Page 10, Line 52: What does the 4 week average trend represent? It's not a moving window correct? Rather just 4 week groupings - weeks 1-4, 5-8, 9-12, etc? If so, why was 4 chosen?</p> <p>--Page 11, Lines 16-45: I have read this section numerous times and still am confused at what is being described. I think that the authors are saying that DA-CPR attempt is when the responder calls dispatch and dispatch attempts to get them to do CPR. In this situation, the responder can give CPR or not. Just for my understanding, here is a hypothetical situation: 100 total arrest of which 5 have voluntary bystander CPR before 911 is called; 65 have successful DA-CPR and 30 have unsuccessful DA-CPR (ie. responder refused to give CPR). Would the ratios for the 3 groups then be 1) - 95 / 5, 2) - 65 / 95, 3) 5 / ?. I'm not sure that #3 is represented correctly in this situation? I would recommend re-writing to be more clear for the reader.</p>
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	<p>--Page 11, Line 55: Mann-Whitney is fine for variables like age that are skewed, but I'd just use simple linear regression for the majority of continuous variables.</p> <p>--Page 12, Lines 37: I might first consider providing results from Table 1 before diving into the BCPR rates.</p> <p>--Page 12, Lines 40-49: I found it strange to give results from the 'other' prefectures first before the tsunami-affected prefectures</p> <p>--Page 13: My takeaway is that there is a baseline rate of 40%. NO matter what season it is or whether there is a pandemic or not, 40% of cases have BCPR. For the impact period in 2010+2012, this rate increases up to over 55%. So the effect we are seeing is that from 55% down to 40%. This is a good finding, but would be even more interesting if the rate during impact phase of 2011 went down to 30%...this would indicate a situation when even those pre-disposed to provide BCPR might not.</p> <p>--Page 14, Lines 16-19: I don't see these estimates in the tables.</p> <p>--Page 14, Line 34: So the thought here is that rhythm modifies the relationship between outcome and impact phase? If so, then an interaction term would be most helpful to see if there was a difference. As it stands now, the CI are not mutually exclusive.</p> <p>--Page 16, Lines 7-13: I am unsure how the BLS training data are presented because I am unable to read reference 23. I assume that each prefecture has an individual rate and those rates are aggregated across the tsunami-prefectures? If not, then I'm not sure how the data was obtained in 2008 and applied to 2011.</p> <p>--Page 37 - The middle panel of Figure 2 is pretty busy. Arrows are too big and labels</p> <p>Minor editing comments</p> <p>--Page 8, Line 34: Is 2020 the correct year here?</p> <p>--Page 16, Line 60: One digit after decimal</p>
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### VERSION 1 – AUTHOR RESPONSE

Reviewer 1:

Abstract

Q1:

Suggest mentioning "nuclear pollution" in the objective as well (already mentioned under exposure and conclusions).

Reply:

Thank you for your suggestion. We added "nuclear pollution" in the objective.

Data analysis

Q2:

I would have been interested in knowing the long-term impacts of BCPR beyond just one year before and after the index incident. The beauty of this study is that longitudinal data might be available to show long-term trends. This will significantly elevate this paper, especially in the context of understanding the impact of disasters (tsunamis, earthquakes, COVID) on pre-hospital care.

Reply:

Thank you for your comment. We did not analyze the long-term impact in this study. The topic is of interest. We are currently conducting a new research on this topic using a larger database including other disasters.

Results

Q3:

The number of BCPRs should be mentioned in the results. The figures for tsunami-affected areas are available in figure 1 but no specific numbers are available for prefectures that were not affected by the tsunami.

Reply:

Thank you for your comment. We mentioned the number of BCPR at the end of section "Validity of the impact phase definition" in Result. Also, we revised the Figure by adding the numbers of OHCA cases during the impact phase in both Tsunami-affected and other prefectures.

Q4:

Last line of page 12 of 38 - Recommend reporting confidence interval or p-value to demonstrate the significance of this reduction.

Reply:

Thank you for your suggestion. We added "P for trend" in the text and in Figure 2.

Discussion

Q5:

Page 16 of 38 - first line - please provide a reference for the claim that BCPR is higher in Japan compared to EU and US.

Reply:

Thank you for your suggestion. We added references to support that Japan's BCPR rate for the three years from 2010 to 2012 was equal to or better than that of the European Union and the United States.

Conclusions

Q6:

The authors correctly mention the importance of BLS training in the context of managing future disasters and major accidents in the conclusion. However, this is not elaborated in the discussion. I think this should be elaborated there, as it is an important point in public readiness.

Reply:

Thank you for your suggestion. We added a few sentences in the last paragraph of DISCUSSION to explain the importance of BLS training in the context of managing future disasters and major accidents in the conclusion.

Other comments

Q7:

Suggest a review of grammatical errors in the manuscript  
- E.g. page 18 of 38, "Third, no researches were conducted..."

Reply:

Thank you for pointing out. We have corrected the part that you pointed out.

Q8:

Suggest reviewing references again please. There are some errors, e.g. Reference 12 is used on line 34 in page 17 of 38 to reference COVID-19 studies however the website the reference links to discusses the earthquake instead.

Reply:

Thank you for pointing out. Regarding the references, I checked the whole thing again and corrected the mistakes.

Reviewer 2:

Overall comments

Q1:

Page 2, Line 34: Cases with bystander CPR performed by others (N=33627) are excluded. If the idea is that pandemic and disasters make people more fearful to infection then wouldn't this group be of interest? Maybe I'm mistaken, but it seems to me that family and friends are more likely to provide BCPR than strangers. If so, then I would expect the results to amplified in this group?

Reply:

Thank you for your comment. After the disaster, many healthcare providers went to the site, and there were many healthcare providers in evacuation shelters and temporary housing. We excluded cases of bystander CPR by others to minimize the impact of these healthcare providers and assess their impact on the general public's BLS behavior. We have also made some modifications in the "Data selection and grouping" section of the method.

Q2:

Page 2, Line 53: Since most of the paper is on the impact phase following the earthquake, I wonder if it would be helpful to add another row to the consort diagram showing this?

Reply:

Thank you for your suggestion. We added impact phase and post-impact phase items to the last line and made overall corrections in figure 1.

Q3:

Page 5: I would like to see brief statistical methods in the methods section of the abstract. Currently they are first mentioned in the results.

Reply:

Thank you for your suggestion. We added a method item to the summary and described a simple statistical method.

Q4:

Page 5, Lines 49-55: This sentence feels more like one for conclusion than results. The next sentence in results provides the actual results.

Reply:

Thank you for your suggestion. We checked the result items again and made corrections.

Q5:

Page 10, Line 52: What does the 4 week average trend represent? It's not a moving window correct? Rather just 4 week groupings - weeks 1-4, 5-8, 9-12, etc? If so, why was 4 chosen?

Reply:

Thank you for your comment. In this survey, the number of cases was small and it was difficult to examine in a short period such as one week. As a result of considering it in several periods, 4 weeks was the easiest to consider, so we set a 4 week average this time.

Q6:

Page 11, Lines 16-45: I have read this section numerous times and still am confused at what is being described. I think that the authors are saying that DA-CPR attempt is when the responder calls dispatch and dispatch attempts to get them to do CPR. In this situation, the responder can give CPR or not. Just for my understanding, here is a hypothetical situation: 100 total arrest of which 5 have voluntary bystander CPR before 911 is called; 65 have successful DA-CPR and 30 have unsuccessful DA-CPR (ie. responder refused to give CPR). Would the ratios for the 3 groups then be 1) - 95 / 5, 2) - 65 / 95, 3) 5 / ?. I'm not sure that #3 is represented correctly in this situation? I would recommend re-writing to be more clear for the reader.

Reply:

Thank you for your comment. We made a major revision regarding the 3 indices for BCPR.

Q7:

Page 11, Line 55: Mann-Whitney is fine for variables like age that are skewed, but I'd just use simple linear regression for the majority of continuous variables.

Reply:

Thank you for your comment. We have made the following modifications in the "Data analysis" section of the method.

Univariate analyses were performed using the chi-square test or Fisher's exact probability test for nominal variables. Because the continuous variables analyzed in this study did not show a normal distribution, the Mann-Whitney U-test was applied for continuous variables.

Q8:

Page 12, Lines 37: I might first consider providing results from Table 1 before diving into the BCPR rates.

Reply:

Thank you for your suggestion. We re-arranged section of Results.

Q9:

Page 12, Lines 40-49: I found it strange to give results from the 'other' prefectures first before the tsunami-affected prefectures

Reply:

Thank you for pointing out. We have made corrections to that part.

Q10:

Page 13: My takeaway is that there is a baseline rate of 40%. No matter what season it is or whether there is a pandemic or not, 40% of cases have BCPR. For the impact period in 2010+2012, this rate increases up to over 55%. So the effect we are seeing is that from 55% down to 40%. This is a good finding, but would be even more interesting if the rate during impact phase of 2011 went down to 30%...this would indicate a situation when even those pre-disposed to provide BCPR might not.

Reply:

Thank you for your comment. The provision of BCPR in the impact phase of the tsunami-affected prefectures did not fall below 40%. After the disaster, in Japan, we will live in groups at public facilities and gymnasiums until temporary housing and evacuation housing are built. Therefore, it is possible that the environment was such that it was easy for family, friends, and colleagues to provide BCPR due to group life at the evacuation center. But we didn't understand why the provision of BCPR didn't drop below 40%.

Q11:

Page 14, Lines 16-19: I don't see these estimates in the tables.

Reply:

Thank you for your advice. We have made corrections and additions to Table 2.

Q12:

Page 14, Line 34: So the thought here is that rhythm modifies the relationship between outcome and impact phase? If so, then an interaction term would be most helpful to see if there was a difference. As it stands now, the CI are not mutually exclusive.

Reply:

Thank you for your comment. In the impact phase of the tsunami-affected prefectures, the neurologically good prognosis indicates that the impact ratio of the shockable initial rhythm was large.

Q13:

Page 16, Lines 7-13: I am unsure how the BLS training data are presented because I am unable to read reference 23. I assume that each prefecture has an individual rate and those rates are

aggregated across the tsunami-prefectures? If not, then I'm not sure how the data was obtained in 2008 and applied to 2011.

Reply:

Thank you for your comment. We have changed the references from 2008 to 2010, 2011, and 2012. When we surveyed the participants of the BLS training, which is tabulated annually by Japan FDMA, we found that the participation rate of residents was high every year in tsunami-affected prefectures. We have made some corrections to the text.

Q14:

Page 37 - The middle panel of Figure 2 is pretty busy. Arrows are too big and labels

Reply:

Thank you for pointing out. Regarding the arrow of Supplemental Figure, it seems that an error occurred when converting to PDF. The figure has been revised.

#### VERSION 2 – REVIEW

<b>REVIEWER</b>	Schmicker, Rob University of Washington, Seattle, Biostatistics
<b>REVIEW RETURNED</b>	05-Jan-2022

<b>GENERAL COMMENTS</b>	Thank you for the thorough response to our review. I am pleased with the edits and feel the paper is appropriate for publication.
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