

PEER REVIEW HISTORY

BMJ Paediatrics Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

ARTICLE DETAILS

TITLE (PROVISIONAL)	Paediatric prehospital emergencies and restrictions during the COVID-19 pandemic: a population-based study
AUTHORS	Oulasvirta, Jelena Pirneskoski, Jussi Harve-Rytsälä, Heini Lääperi, Mitja Kuitunen, Mikael Kuisma, Markku Salmi, Heli

VERSION 1 – REVIEW

REVIEWER	Reviewer name: Dr. Peter Flom Institution and Country: Peter Flom Consulting, United States Competing interests: None
REVIEW RETURNED	28-Jul-2020

GENERAL COMMENTS	<p>I confine my remarks to statistical aspects of this paper. Unfortunately, I think there are some major issues to be addressed before I can recommend publication. The problem is with combining data. First, the data are combined within each year. This makes a lot of data into 4 data points for each variable. Second, the first three years are combined. That masks any variation among those years, including any trend. And it makes each variable have only two data points.</p> <p>There are two possible solutions:</p> <p>One</p> <ol style="list-style-type: none">1, Determine the seasonality of the data (this might require more data)2. Remove the seasonal component3. Compute mean and sd for the seasonally adjusted values4. Use that to figure out the likelihood of the 2020 data. <p>However, that may prove impossible. A second choice:</p> <p>Two.</p> <ol style="list-style-type: none">1. Examine, graphically, the trend for each year2. Then, possibly, compare individual months, or aggregate some months. then either3. Use appropriate regression models with time as the independent variable or4. Do some other form of comparison, without aggregating across years. <p>Peter Flom</p>
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REVIEWER	Reviewer name: Dr. Santiago Mintegi
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	Institution and Country: Cruces University Hospital, Plaza de Cruces s/n, Barakaldo, 48903, Spain Competing interests: None
REVIEW RETURNED	09-Aug-2020

GENERAL COMMENTS	<p>Dear Editor</p> <p>I have carefully read the Manuscript ID bmjpo-2020-000808 entitled "Paediatric prehospital emergencies and restrictions during the COVID-19 pandemic: a population-based study" for the BMJ Paediatrics Open.</p> <p>The authors wanted to study if and how Finnish governmental restrictions aimed to constrain the local pandemic projected to paediatric prehospital emergency medical services (EMS) contacts.</p> <p>I think that it is an interesting paper to be published but I suggest some comments to be considered by the authors</p> <p>Major considerations</p> <ul style="list-style-type: none"> • I suppose that EMS and ambulances in Finland were working treating adults more that it is usual. Did EMS receive any suggestion/guide to change the paediatric patients transported to the ED? If yes, it should be commented because it could be a significant bias for the transportation of these children. The authors say that some recommendations were given for a better use of the EMS by the population. Was any specific recommendation about transporting children to the EDs given to the EMS? • In the Introduction section, authors remark that "it is important to analyse whether this change has taken place at the cost of health risks for children" and "we wanted to study whether the decrease in 18 paediatric EMS contacts and transports has led to patient safety hazards". I do not think that this is possible to be assessed with this study. I think that you should need to analyse the outcome of those children that usually contact with the EMS and that, during the pandemic, have not contacted with the EMS. This is difficult to be analysed. I think that you can suggest that the decrease of the utilization of paediatric EMS can be associated with a change of the care provided to children out of the hospital (and, also, the quality of care), but, with the study carried out, I think that it is not possible to assess what you mention in the Introduction section. For instance, it is possible that a family of a critical patient contacted with the EMS before the pandemic and not now, due to fear, less availability of ambulances,... and it would be interesting to analyse the way of presentation of those critical patients to the ED before and during the pandemic and the impact of a possible more infrequent use of the EMS. <p>Minor comments:</p> <ul style="list-style-type: none"> • In order to be clear for non-Finish readers I understand that, after contacting with EMS, all the children are examined by EMS personnel that go where the child is. Is this correct? If correct, clarify it a bit more, because not all the EMS I know work in this way. In some EMS, the decision to go or not to go is made after talking with the person calling to the EMS. • I think that table 1 can be included in the text. • I think that Figure 4 can also be included in the text. It is not the objective of the study. • I am a bit confused with the following: In the discussion section, the authors say that "Even though emergency calls for children were more often categorised urgent, they lead more likely to not transporting the child to hospital". Do you think that population used better EMS during the pandemic? In fact, you say that "Successful public guidance during the state of
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	<p>emergency, eliminating unnecessary” EMS contacts (9,17) may partly explain the sudden decrease in EMS contacts.” So, really, there was a policy related to this and it was not only due to the decision of the parents.</p> <p>However, you also say that “prehospital paediatric deaths increased”. I could think that given recommendations were somehow “dangerous”. When you see the results, I cannot see any explanations of the deaths and (being so few patients) this can or cannot be related to the pandemic and the use of EMS. I think this must be better explained. And I think that “the pandemic had unanticipated secondary effects on the emergency healthcare of children” can be suggested but not confirmed with this study. In addition, the rate of interventions on-scene (except for intubations) increased. This does not fit well with fewer transportations to the ED and I think this also warrants a place in the discussion section of the manuscript.</p>
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VERSION 1 – AUTHOR RESPONSE

Dear Dr. Ian Maconochie and Prof. Imti Choonara,

Thank you for accepting our manuscript entitled “Paediatric prehospital emergencies and restrictions during the COVID-19 pandemic: a population-based study” for a review. We note that the Reviewers found our results interesting, and made valuable suggestions on how to better analyse, interpret and present our results.

In accordance with these suggestions, we have now thoroughly revised the manuscript. We agree with the Reviewer 1 that our statistical methods were not in line with the aims and conclusions originally expressed in the manuscript. We apologise for having been too ambiguous and have now carefully revised the manuscript to clarify the aims and conclusions of the study. In addition, we have made our best in an attempt to express ourselves comprehensibly and present our results clearly. We would like to provide the following point-by-point replies to you and the Reviewers below. We hope that with these major revisions, you will find our manuscript suitable and interesting for the readers of BMJ Paediatrics Open. All authors have participated in the revision and approved the new manuscript.

Yours respectfully,
Jelena Oulasvirta

Reviewer: 1

I confine my remarks to statistical aspects of this paper. Unfortunately, I think there are some major issues to be addressed before I can recommend publication. The problem is with combining data. First, the data are combined within each year. This makes a lot of data into 4 data points for each variable. Second, the first three years are combined. That masks any variation among those years, including any trend. And it makes each variable have only two data points.

There are two possible solutions:

One

1. Determine the seasonality of the data (this might require more data)
2. Remove the seasonal component
3. Compute mean and sd for the seasonally adjusted values
4. Use that to figure out the likelihood of the 2020 data.

However, that may prove impossible. A second choice:

Two.

1. Examine, graphically, the trend for each year
2. Then, possibly, compare individual months, or aggregate some months. then either
3. Use appropriate regression models with time as the independent variable or
4. Do some other form of comparison, without aggregating across years.

Peter Flom

Dear Peter Flom,

Thank you for your valuable comments on statistical methods.

We apologise for the fact that it may have looked like we wanted to report causal connection between the pandemic and the exceptional decrease in the number of EMS contacts. The number of EMS contacts does not vary randomly from one time period to another, but changes due to multiple phenomena in the society. Also, showing a presence or absence of seasonal variability was not our focus. Still, we agree that it could add value to our manuscript if we show that seasonal variation of this magnitude in the EMS contacts for children is unlikely to have been caused by random variability.

We agree that our methods are not ideal for comparing the pandemic and the time before it. However, as the pandemic proceeds rapidly, there are no ideal methods available to study emergency medical services in children. Thus, we have now made clearer in the manuscript that our results represent associations, not causalities. We can only describe the temporal phenomenon, and our results can then be confirmed or rejected by other studies in other systems.

We are aware that there are numerous potential confounders. However, this is a common challenge when studying children in a prehospital setting, where social and environmental factors may have more unpredictable confounding effects than in an in-hospital setting. Thus, we have tried to clarify that we cannot separate the effects of different control measures from those of the disease itself. The results of our study describe the sum of the effects of the pandemic and its control measures on the society.

Our challenge was the small number of patients because of the short duration of the first wave of pandemic in Finland, so that the study period remained short as well. We agree with the fact that there is considerable seasonal variation especially in the incidence of infectious diseases e.g. RS-virus in children. Thus, we have addressed the question about seasonal variation by always using the same months (March, April, May) for each control year (not just e.g. previous months) as control periods. The trends for each year are visible in the Figure 1 (dotted lines) and also provided in the Supplementary Material 1. We have also included a new Supplementary Table 2 (in the Supplementary Material 1) to compare the number of EMS contacts within the control periods. The potential seasonal effects were assumed to be the same between the included years. Although we did not observe major seasonal effects that persisted through all the previous years in this study as shown in the included figures, or in our previous study (1), we chose to use three years instead of one or two for control periods in order to exclude possible pre-existing trends that could confound our results. We did not want to compare the pandemic to a specific year. Instead, we wanted to investigate how the EMS contacts during the pandemic compared to what we would have expected to observe without the COVID-19 pandemic.

Thus, we feel that aggregating weekly events of the previous three years gives a reliable baseline

estimate to compare against the weeks of the current year. Our aim was to find and demonstrate clinically significant changes in EMS contacts during the pandemic even if this approach does not confirm a causal connection. Therefore, we feel that our current approach fulfils the aims of the study and is the most illustrative method for the potential reader of BMJ Paediatrics.

Reviewer: 2

Dear Editor

I have carefully read the Manuscript ID bmjpo-2020-000808 entitled "Paediatric prehospital emergencies and restrictions during the COVID-19 pandemic: a population-based study" for the BMJ Paediatrics Open.

The authors wanted to study if and how Finnish governmental restrictions aimed to constrain the local pandemic projected to paediatric prehospital emergency medical services (EMS) contacts.

I think that it is an interesting paper to be published but I suggest some comments to be considered by the authors

Major considerations

- I suppose that EMS and ambulances in Finland were working treating adults more than it is usual. Did EMS receive any suggestion/guide to change the paediatric patients transported to the ED? If yes, it should be commented because it could be a significant bias for the transportation of these children. The authors say that some recommendations were given for a better use of the EMS by the population. Was any specific recommendation about transporting children to the EDs given to the EMS?

Dear Santiago Mintegi,

Thank you for the thoughtful comments on our manuscript. One could think that ambulances were busy treating adults during the pandemic. However, the number of EMS contacts with adults decreased during the pandemic in our area, but not as much as with children. In our area, COVID-19 patients were mostly recognised and tested in the very early phase of the COVID-19 disease. These patients were mostly cohorted to specialised hospital units offering all-level care and, thus, interhospital transfers were rarely needed. Also, the guidance and information to the patients not needing in-hospital treatment was well organised, and the transport of the previously confirmed COVID-19 patients for further treatment between hospital units was organised by another service providers than the EMS. Thus, the EMS were not constrained by COVID-19 patients during the pandemic.

There were no new recommendations on transporting or not transporting in the EMS. The EMS personnel were instructed to use the same criteria for non-transport decisions concerning children as before the pandemic. The health authorities reminded the citizens to use EMS for real emergencies only, not e.g. to get guidance. A helpline concerning questions related to COVID-19 was established to avoid having these enquiries to the emergency line 112.

- In the Introduction section, authors remark that "it is important to analyse whether this change has taken place at the cost of health risks for children" and "we wanted to study whether the decrease in 18 paediatric EMS contacts and transports has led to patient safety hazards". I do not think that this is possible to be assessed with this study. I think that you should need to analyse the outcome of those children that usually contact with the EMS and that, during the pandemic, have not contacted with the EMS. This is difficult to be analysed. I think that you can suggest that the decrease of the utilisation of paediatric EMS can be associated with a change of the care provided to children out of the hospital (and, also, the quality of care), but, with the study carried out, I think that it is not possible to assess what you mention in the Introduction section. For instance, it is possible that a family of a critical patient contacted with the EMS before the pandemic and not now, due to fear, less availability of

ambulances,... and it would be interesting to analyse the way of presentation of those critical patients to the ED before and during the pandemic and the impact of a possible more infrequent use of the EMS.

Thank you for this important comment on our study aims. You are right that in order to fully cover potential patient safety hazards imposed by the COVID-19 pandemic to children, we should also have studied those children who did not contact the EMS. Unfortunately, this information was not available to us. Moreover, we believe that we can see the indirect effects of the pandemic by examining the variables we had access to. If there were no changes in the medical status of children contacting the EMS, there would be no changes in the proportion of dispatch priority. However, the missions with dispatch priority class A (the most urgent dispatch class) almost doubled. We noticed the increase not only in the dispatch, but also in transportation with the most urgent priority class A. Also, additional help and an emergency physician were requested more frequently than previously. All in all, even if we could not study the children who may have avoided the contact with EMS, those children who did contact the EMS were in a poorer condition than would have been reasonable to expect. We have now rephrased our aims.

Minor comments:

- In order to be clear for non-Finish readers I understand that, after contacting with EMS, all the children are examined by EMS personnel that go where the child is. Is this correct? If correct, clarify it a bit more, because not all the EMS I know work in this way. In some EMS, the decision to go or not to go is made after talking with the person calling to the EMS.

Thank you for this remark. The ERC operators are not healthcare professionals in Finland, and they handle all emergency calls regardless the type of the emergency. Thus, the caller does not request “an ambulance” or “the police” or “the rescue department”, but simply tells the operator what has happened. Then, the operator dispatches the appropriate help according to a formal protocol. If the ambulance is dispatched, the EMS personnel always encounter the patient, and the possible non-transport decision is only made after on-scene examination. We have clarified this in the Methods section.

- I think that table 1 can be included in the text.

Thank you for this comment. We have removed Table 1 and included its most important figures in the text.

- I think that Figure 4 can also be included in the text. It is not the objective of the study.

We have rewritten the text and removed Figure 4 as suggested.

- I am a bit confused with the following:

In the discussion section, the authors say that “Even though emergency calls for children were more often categorised urgent, they lead more likely to not transporting the child to hospital”. Do you think that population used better EMS during the pandemic? In fact, you say that “Successful public guidance during the state of emergency, eliminating unnecessary” EMS contacts (9,17) may partly explain the sudden decrease in EMS contacts.” So, really, there was a policy related to this and it was

not only due to the decision of the parents.

We apologise for expressing ourselves ambiguously. What we meant to discuss was that

- 1) we first noticed a decrease in paediatric EMS contacts;
- 2) we then wondered whether this represented a welcomed change in the behaviour of families with children, eliminating unnecessary - non-urgent or non-medical - EMS contacts as families wanted to avoid overcrowding EMS and EDs during a state of emergency;
- 3) or whether, on the contrary, the change was due to families with children not daring to contact emergency services even when needed, due to misleading public guidance delivering a “stay at home” –message;
- 4) or a combination of these (“successful public guidance may partly explain the results”).

We have now reformulated the paragraph.

The fact that hospital transports decreased even if more EMS contacts were categorised as urgent is puzzling. In fact, several factors suggest that after the overall decrease in EMS contacts, the remaining contacts were more often critical: namely, they were more often in the most urgent category and MICU or supplementary units were more often requested on scene. Thus, it is difficult to explain why these contacts more often lead to not transporting the child to hospital. In fact, in an urban area such as the study area, with short distances and other transports readily available, the EMS non-transport decision is not a straightforward “yes or no” -issue, but instead it often results from complex reasoning with the caregivers. Not only medical arguments are involved in the decision-making, but social and economical aspects as well. In fact, we feel that the special circumstances created by the pandemic and its media coverage may have played a role. Even if the EMS did not receive explicit new instructions about transporting, the personnel were equally exposed to the general guidance stating that all unnecessary contacts should be avoided, and that EDs and the health care system were at a risk of becoming overwhelmed. On top of that, there were practical obstacles such as the new instructions about cleaning the ambulance after every transport and accepting parents to the ambulance only in case of very young children. These may well have influenced the practices even without formal new instructions. We have made our best effort to formulate this clearly in the text.

However, you also say that “prehospital paediatric deaths increased”. I could think that given recommendations were somehow “dangerous”. When you see the results, I cannot see any explanations of the deaths and (being so few patients) this can or cannot be related to the pandemic and the use of EMS. I think this must be better explained

There were four on-scene deaths during the study period of three months, as compared to an average of 0-2 deaths. All deaths were separate incidents, and none of the four children had severe underlying medical conditions which could have explained the sudden out-of-hospital death.

It is not possible to make statistical comparisons with these figures. Still, as a sudden out-of-hospital death in a previously healthy child is very rare event in a welfare country, we feel that we need to report these figures, especially as they are from a period when major changes in the essential functions of the society and the healthcare system, and in the behaviour of families with children, took place. We can safely say that the increased number of deaths was not due to the COVID-19 disease as there are no reported COVID-19 deaths among children in Finland. Instead, we are concerned that the control measures of the COVID-19 pandemic may have contributed to possible delays in treatment of other medical conditions and in the ability of our healthcare system to respond to the needs of families with children. Unfortunately, we cannot give full details of the deaths on-scene due to confidentiality, as these children would be easily recognisable due to the study area and the short study period.

We have now tried to express this finding and its possible significance more clearly.

And I think that “the pandemic had unanticipated secondary effects on the emergency healthcare of children” can be suggested but not confirmed with this study.

We agree that this statement was too strong. We have reformulated the phrase and state that our results are suggestive of such secondary effects.

In addition, the rate of interventions on-scene (except for intubations) increased. This does not fit well with fewer transportations to the ED and I think this also warrants a place in the discussion section of the manuscript.

This finding is contradictory in the same way that the fact about the EMS contacts being more often categorised as urgent, and still more often leading to not transporting the patient. Please see our reflection above. The text has also been modified accordingly.

Editor in Chief

Comments to the Author:

Figures showing data for each year would be helpful (see comment of reviewer 1).

Thank you for your comments. We have included figures for each year in the Supplementary Material 1, as we thought that too much data in the Manuscript might be confusing for the reader. Also, we had already included the trends for previous years in the Figures.

Additionally, please see the response for the Reviewer 1.

Your figures at present are too numerous and too confusing. Decide which figures are essential. Some can be supplementary figures. Figure 1 is actually 4 separate figures (Fig 1a is the important one).

We have reconsidered the importance of each Figure and have substantially reduced the number of Figures and Tables.

Until the results and the statistical analysis are correct, one cannot comment on the interpretation

We resubmit the revised manuscript for consideration for publication. We hope that the revised version will fulfil the high standards of BMJ Paediatrics Open.

References:

1. Harve H, Salmi H, Rahiala E, Pohjalainen P, Kuisma M. Out-of-hospital paediatric emergencies: a prospective, population-based study. Acta Anaesthesiol Scand. 2016 Mar;60(3):360–9.

VERSION 2 – REVIEW

REVIEWER	Reviewer name: Dr. Peter Flom Institution and Country: Peter Flom Consulting, United States Competing interests: None
REVIEW RETURNED	14-Sep-2020

GENERAL COMMENTS	The authors have addressed my concerns and I now recommend publication.
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VERSION 2 – AUTHOR RESPONSE

September 16th, 2020

Dear Dr. Ian Maconochie and Prof. Imti Choonara,

Thank you for accepting our manuscript entitled “Paediatric prehospital emergencies and restrictions during the COVID-19 pandemic: a population-based study” for a review.

We are happy that the Reviewer(s) have recommended the publication and you are considering our manuscript for publication after minor revisions.

In accordance with your suggestions we have now revised the manuscript and include our response below. We hope that with these revisions, you will find our manuscript suitable and interesting for the readers of BMJ Paediatrics Open. All authors have participated in the revision and approved the new manuscript.

Yours respectfully,
Jelena Oulasvirta

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Reviewer: 1
Reviewer name: Peter Flom

Reviewer: 1
Institution and Country: Peter Flom Consulting USA

Reviewer: 1

Comments to the Author

The authors have addressed my concerns and I now recommend publication.

Thank you for your recommendation.

Editor in Chief

Comments to the Author:

Your paper is much better. Thank you. Figures 2 and 3 remain incomprehensible. Fig 2 relates to children speaking one of the national languages. I suggest presenting this data as text (one sentence). Fig 3 is covered by table 1. I suggest deleting both Figures.

Thank you for your kind words. Figures 2 and 3 have now been removed from the Manuscript and a sentence about children speaking one of the national languages added to the Results.