ARTICLE DETAILS

TITLE (PROVISIONAL)	Accuracy of emergency medical services (EMS) telephone triage in identifying acute coronary syndrome (ACS) for chest pain patients: A systematic literature review
AUTHORS	Alotaibi, Ahmed; alghamdi, abdulrhman; Reynard, Charles; Body, Richard

VERSION 1 – REVIEW

REVIEWER	Rutten, Frans Julius Centre for Health Sciences and Primary Care, University Medical Centre Utrecht, Department of General Practice
REVIEW RETURNED	22-Dec-2020

GENERAL COMMENTS	Accuracy of emergency medical services (EMS) telephone triage in identifying acute coronary syndrome (ACS) for chest pain patients: A systematic literature review of Aloitibi A, et al, BMJopen-2020-045815
	The authors performed a systematic search, and only three out of >500 papers fulfilled the inclusion criteria. The authors summarised these three studies that had developed a prediction model for ACS that was derived from the domain of patients with chest discomfort that called the emergency medical services. In two studies –both from Sweden and with the same first author- the performance of the prediction model was compared to the EMS dispatch system. All three studies had major methodological shortcomings and a formal meta-analysis was not possible due heterogeneity and different definitions for ACS/acute myocardial infarction, and other life-threatening events among the studies. The paper could be improved by providing more details of the studies, in text and tables, and a discussion in which also the clinical perspective and consequences are better highlighted. Now the discussion is rather meagre.
	Major Comments - The authors are correct in being critical about the three reviewed studies. Nevertheless they provided a strong conclusion: 'EMS dispatch systems accuracy for ACS and life-threatening conditions associated with chest pain is good….. Over triage were slightly reduced by deriving different prediction models and showed better sensitivity.' Can this strong conclusion be derived from these studies? If I am correct, the authors do not provide accuracy data or c-statistics of the EMS algorithm.

	- Given the shortcomings, the authors could possibly add a paragraph to the discussion about what they recommend for future research. How should the EMS be evaluated and a novel prediction model developed? Minor Comments - There is insufficient data on the outcomes in the study, e.g. percentages of ACS, preferably subdivided into STEMI, NSTEMI, UAP, and in percentages of other life-threatening diagnoses, e.g. pulmonary embolism, acute heart failure, aortic dissection, etc. - Please mention in one of the tables the percentages outcome. - Please provide in the table or text at what cut-point (how many items had to be positive or negative) the sens, spec, ppv, npv were calculated. - Please also provide the AUC/c-statistics of the EMD dispatch system if available. - In patients with AMI, certainly STEMI, 'time is muscle'. Moreover, you only get a single chance to reduce the myocardial damage. That is a main reason why on average ED physicians consider 1% missing acceptable. With the EMD dispatch system, sensitivity was around 85-90%, which means that 10-15% of the patients received a too low urgency, and therefore the risk of missing the window of opportunity for revascularisation. Nevertheless, the authors consider the tool as good. But in my opinion it is certainly not safe. Please comment in the discussion. - The overall rather acceptable performance of the prediction models (AUC 0.76-0.79), this is mainly because of rather high negative values driven by the low prevalence of ACS/LTE in the domain of study. Please comment in the discussion.

GENERAL COMMENTS	This article is about an important topic, the large percentage of people who call for help and have acute coronary symptoms, ACS. It can be crucial for the patient's further care that the symptoms are assessed correctly in the early stage in the chain of care.. That's why this article is important and relevant. However, there are shortcomings, overall I believe that the language needs to be corrected, and to avoid repetition of information in some places, and write the abbreviations when they mentions the first time. The most important comment is about the objective. The aim was "to systematically appraise the available evidence to determine the diagnostic accuracy of the EMS telephone triage for patients with chest pain suspected to be caused by ACS or life threatening conditions." It is well known in emergency medicine that patients early in the care chain, ie in contact with the emergency center, ambulance and initially in the emergency department - come with symptoms. That is, it is not possible to make a diagnosis at those stages of healthcare; by phone etc. It is interesting to know what and if there is evidence to identify the area in question, but to have the purpose of diagnosing by telephone is not possible. So maybe reformulate the objective. I attached the script file with my comments in the text – please contact the publisher for this file.

VERSION 1 – AUTHOR RESPONSE

Comment	Action
1- Please refer to the PRISMA extension for Abstracts and reformat your abstract accordingly. For more information, please visit http://www.prisma-statement.org/Extensions/Abstracts	Thank you for pointing this out. We have now included the PRISMA abstracts checklist. We have added reference to funding and registration on page 4. The abstract is now fully compliant with the PRISMA abstract checklist. However, the words count is 405 now because we added sections to meet PRISMA checklist. Therefore, we will submit part of it in the abstract box due to website abstract words count limit. The whole abstract is included in the main file.
2- Please carefully proofread your manuscript. For example, on page 4 "NPV: Negative Productive Value". Please note that there are many other errors throughout.	Thank you for your feedback. Fixed the typing error.
3- Please add the dates of the search to the Abstract.	Added. Thank you.
4- The Results section of the Abstract needs revising – for example, it is unclear what you are referring to in the sentence: "and therefore it showed better sensitivity and NPV". Better than what?	Rephrased the sentence to clarify the confusion. Thank you very much.
5- Please ensure that all acronyms are defined on first mention.	Revised and defined all the acronyms on first mention. Thank you for your feedback.
6- Please include a full electronic search strategy for at least one database.	I have included a table for the search strategy in EMBASE and MEDLINE including (Keywords, and articles result numbers). I will upload it as supplementary document.

7- More details are needed in the tables.	I added a new table to include the number of patients with each individual outcome within each study. Unfortunately, there was no subgroup for LTC outcome. Thank you for your feedback.
8- Can you improve Figure 2 to show the assessment for each study?	Sure, I added the authors' names to the figure.
9- Please clarify why you included the study by Gellerstedt et al (2006), which used an outdated definition of AMI so the results could not be applied to modern clinical practice.	We endeavoured to include all of the best available evidence. Because we only identified three relevant studies, we felt that it was important to include this study but to acknowledge that the definition of AMI used is now outdated. (It was current at the time of publication).
10- The Discussion needs expanding to include the implications for clinicians and policy makers Considering that you were unable to carry out the meta-analysis, please rewrite and tone down the Conclusion section, ensuring that the conclusions are fully supported by your results.	Thank you very much for your valuable feedback. We have now added to the discussion to account for your insightful comments. We have also rephrased the conclusion.
11- Major: The authors are correct in being critical about the three reviewed studies. Nevertheless they provided a strong conclusion: 'EMS dispatch systems accuracy for ACS and life-threatening conditions associated with chest pain is good….. Over triage were slightly reduced by deriving different prediction models and showed better sensitivity.' Can this strong conclusion be derived from these studies? If I am correct, the authors do not provide accuracy data or c-statistics of the EMS algorithm.	Thank you for noticing the issue. The conclusion has been rephrased.
12-Major: Given the shortcomings, the authors could possibly add a paragraph to the discussion about what they recommend for future research. How should the EMS be evaluated and a novel prediction model developed?	We added this point within the first paragraph. Also, considered in the future research. Thank you very much for your valuable feedback.

13- There is insufficient data on the outcomes in the study, e.g. percentages of ACS, preferably subdivided into STEMI, NSTEMI, UAP, and in percentages of other life-threatening diagnoses, e.g. pulmonary embolism, acute heart failure, aortic dissection, etc.	Thank you for your feedback. I added a table to report further details of the number of patients with each individual outcome from each study. Unfortunately, some of the data were unavailable for the suggested subgroups, meaning that not all of the details could be added to the table.
14- Please mention in one of the tables the percentages outcome	I have added the percentages to the new table along with details of the outcomes. Thank you very much for your valuable feedback.
15- Please provide in the table or text at what cut-point (how many items had to be positive or negative) the sens, spec, ppv, npv were calculated.	Unfortunately, none of the papers mentioned the cut-off point or the formula for the prediction models.
16- Please also provide the AUC/c-statistics of the EMD dispatch system if available.	Unfortunately, neither study that reported EMD dispatch system provided AUC/C statistics.
17- In patients with AMI, certainly STEMI, 'time is muscle'. Moreover, you only get a single chance to reduce the myocardial damage. That is a main reason why on average ED physicians consider 1% missing acceptable. With the EMD dispatch system, sensitivity was around 85-90%, which means that 10-15% of the patients received a too low urgency, and therefore the risk of missing the window of opportunity for revascularisation. Nevertheless, the authors consider the tool as good. But in my opinion it is certainly not safe. Please comment in the discussion.	We agree that this is an important point. We have highlighted this under 'Future research' and we have extensively revised the discussion and conclusions sections to account for this.
18- The overall rather acceptable performance of the prediction models (AUC 0.76-0.79), this is mainly because of rather high negative values driven by the low prevalence of ACS/LTE in the domain of study. Please comment in the discussion.	Thank you. We have now emphasised the point that reporting the AUC alone is insufficient to support clinical implementation.

19- in some places, and write the abbreviations when they mentions the first time. The most important comment is about the objective. The aim was "to systematically appraise the available evidence to determine the diagnostic accuracy of the EMS telephone triage for patients with chest pain suspected to be caused by ACS or life threatening conditions." It is well known in emergency medicine that patients early in the care chain, ie in contact with the emergency center, ambulance and initially in the emergency department - come with symptoms. That is, it is not possible to make a diagnosis at those stages of healthcare; by phone etc. It is interesting to know what and if there is evidence to identify the area in question, but to have the purpose of diagnosing by telephone is not possible. So maybe reformulate the objective.	Thank you very much for your valuable feedback. Abbreviations were double checked and all of them have now been expanded at the first mention. Thank you for this important point about the way we phrased the objectives. We have now re-phrased this to state that this is about priority allocation rather than diagnosis

VERSION 2 – REVIEW

REVIEWER	Rutten, Frans Julius Centre for Health Sciences and Primary Care, University Medical Centre Utrecht, Department of General Practice
REVIEW RETURNED	02-Apr-2021

GENERAL COMMENTS	The authors answered the questions raised adequately.