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Letter to the Editor

Reply letter to "Machine learning as a supportive tool to recognize cardiac arrest in emergency calls"



To the Editor,

We thank Dr. Müller and Dr. Brejnbøl for their interest in our recently published study on machine-learning in cardiac arrest recognition. We appreciate the interest in our publication and are happy to take part in further discussion.

As Dr. Müller and Dr. Brejnbøl points out, not only sensitivity, but also specificity is important for any diagnostic test and suggests that results consistently should emphasize the statistically significant difference in specificity and consistently report significantly lower specificity.

We recognize the importance of the specificity of the machine-learning network, and found in our study, that the machine-learning framework had a specificity of 97.3% (95% CI 97.2%–97.4%). This was compared to the recorded specificity of the dispatchers which were 1.5% higher at 98.8% (95% CI 98.7%–98.8%). So, while we found the machine learning framework to have 1.5% lower specificity, which was statistically significant, we did not find this difference disturbing, as the sensitivity of the same framework was 11.7% higher.

Dr. Müller and Dr. Brejnbøl also suggest that the overall accuracy of the machine-learning framework should be calculated and listed in order to support the statement in the abstract that the machine-learning network overall performed better than dispatchers. Dr. Müller and Dr. Brejnbøl further suggest that either the accuracy or the receiver operating characteristics of the test could instead be used to judge if the test was in fact overall superior.

Although we agree this would be of great interest, we find that reporting sensitivity and specificity along with positive and negative predictive value does describe elements in the machine-learning frameworks performance. The clinically relevant measure in our study is sensitivity. While specificity is important, we find sensitivity more important. The consequence of a false positive would be initiation of telephone assisted CPR on a living person, which might be unpleasant but rarely harmful.^{1,2} The consequence of false negative is harmful, as previous research has shown that telephone assisted CPR save lives.³ We find that

while both specificity and sensitivity is important, they are in this case not equally important.

However, Sensitivity is not the only measure that supports the statement that the machine-learning network performs better. We also found that the machine-learning network had a statistically significant shorter time-to-recognition than the dispatcher, and it was the sum of these factors that led us to conclude the machine performed 'better'.

Dr. Müller and Dr. Brejnbøl concludes in their letter, that if the machine-learning framework were directly applied, it would lead to an additional 1616 false-positive recognitions of OHCA, and this would put a significant strain on the emergency system. We do not find this claim to be correct. As previously mentioned, the consequence of a false positive is that telephone-assisted CPR is initiated. This will as such not put a strain on the emergency services — even though it might be unpleasant for the patient. Next, we also found in our retrospective study, that 87% of the false positive OHCA historically had been transported to the hospital with highest priority, so these would not have placed any further strain on the emergency system.

We find no reason to change our conclusion or abstract, and still finds that when observing the clinical important issue — survival after OHCA, the machine-learning framework performs better than the dispatcher as it is pivotal for survival that telephone-assisted CPR is initiated — even while we observe false positives.

Conflict of interest statement

Authors have no conflicts of interest relating to the present work.

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