Artificial Intelligence in Copenhagen EMS to improve patient care

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What was the last major change in practice that you experienced in your call center?





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in FreddyLippert



COI and Acknowledgment

- The Danish Foundation "TrygFonden" **TrygFonden** www.trygfonden.dk
- The Laerdal Foundation
- Corti.Al as partner



Laerdal Foundation helping save lives







This presentation

- Our story: Why trying AI to improve survival from cardiac arrest
- Our research: who is better in cardiac arrest call: humans or artificial intelligence?
- The potential of using artificial Intelligence as a decision tool
- What's next



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How to improve survival rates



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The role of the dispatcher

We know



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- 1. Dispatcher recognition of cardiac arrest increases survival rate by 200%
- 2. Bystander CPR increases survival rate by 300-400%
- 3. AED used survival rate up to 50-70%

Dispatcher identifying cardiac arrests, initiates bystander CPR, provide guidance on CPR and refer to an AED has a huge impact on survival





Who identifies cardiac arrest

- Bystander identifies 20 % of cardiac arrest cases and call
- Dispatcher identifies an additional 50-60 % best results
- Missing 25% of all cardiac arrest during the call

EGION œ

Region Hovedstaden Akutberedskab

Our idea and collaboration with a start-up Corti







Region Hovedstaden

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Clinical paper

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

Stig Nikolaj Blomberg^{a,b,*}, Fredrik Folke^{a,b,c}, Annette Kjær Ersbøll^d, Helle Collatz Christensen^a, Christian Torp-Pedersen^{e,f}, Michael R. Sayre^g, Catherine R. Counts^g, Freddy K. Lippert^{a,b}

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Editorial

Man vs. machine? The future of emergency medical dispatching

The role of emergency medical dispatch (EMD) in out-of-hospital cardiac arrest is incréasingly being recognized as an underutilized resource in a number of ways. From merely being the recipient of a bystander's call for an ambulance, we are recognizing that the EMD has a pivotal role in helping diagnose cardiac arrest, initiate resuscitation and support lay rescuers in optimizing resuscitation efforts.^{1,2} As health care professionals they have access to increasing resources, and new technologies and innovations keep changing their role in the chain of survival.³ Many EMD systems are now able to map out the nearest Automated External Defibrillators (AEDs), and some can even dispatch additional nearby volunteer lay rescuers to bring an

verbal confirmation needed to pinpoint time to recognition without accurately reflecting delayed recognition by the dispatcher. The difficulty in defining the exact time point of dispatcher cardiac arrest recognition challenges both EMD research and quality improvement efforts.

The third objective of this study was exploring how machine learning performed differently compared to dispatchers. While very few arrests were only identified by dispatchers, there were some interesting differences in the arrests only identified by the machine that invites speculation. It is interesting that the machine outperforms the dispatcher where the caller witnesses the arrest.⁶ One might

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Nikolaj Stig Blomberg



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What is AI or machine learning



Input \rightarrow **BLACK BOX** \rightarrow Output



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Stig Nikolaj Fasmer Blomberg

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Resuscitation 2019 DOI: 10.1016/j.resuscitation.2019.01.015



Time-to-recognition



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Results

- Calls: 108.6087
- Cardiac Arrest 918 (0.8 %)
- Human vs machine:
- Sensitivity: 72.5 vs 84.1 %
- Specificity: 98.8 vs 97.3 %
- Positive Predictive Value PP
- 33.0 vs 20.9 %





Resuscitation 2019 DOI: 10.1016/j.resuscitation.2019.01.015



Can AI recognize cardiac arrest from voicelogs. Retrospective study all calls in 2014

Status	Medical dispatch	Machine learning framework
Recognized cardiac arrests	665	772
Unrecognized cardiac arrests	253	146
Cardiac arrest in population	918	918



Time to detection

CEMS Dispatcher

MLF: Machine

Combined





Humans vs Machine

- •AI is better in recognition of cardiac arrest by just listening
- •Why? Years of experience in one model, remember every case, use pattern recognition, no human bias



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A GUIDE TO THE MEDICAL DIAGNOSTIC AND TREATMENT

From gut feeling to algorithms and to now Al







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Innovation in EMS – Al for decision support in dispatch centre



Machine Learning https://www.youtube.com/watch?v=c1rJZQ-LAhw&feature=youtu.be

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Perspectives for emergency patient care

- Supporting decision making in emergency call and nonemergency calls
- •Other emergencies (stroke, sepsis, trauma)
- Triage tool making risks assessment (ambulance, emergency department, hospitalization, intensive care unit, death)
- •Adding other health care data into the model
- •Guidance to dispatchers during the call
- •AI being the call taker?



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Partnership for EU Horizon 2020 grant on

Artificial Intelligence to improve emergency patient care NAKOS, RAKOS, KoKom, SOS Alarm







Summary

- Identifying the cardiac arrest during emergency call is essential to survival
- Using machine learning shows that AI is better than human identifying cardiac arrest during an emergency call
- The potential of using Artificial Intelligence in emergency care is enormous





More references on Al

- _Resuscitation 2019
- https://www.resuscitationjournal.com/article/S0300-9572(18)30975-4/pdf
- BBC podcast: People who fix the world
- BBC <u>https://www.bbc.co.uk/programmes/p07p3fn7</u>



