+priokritisk

Early identification of clinical deterioration among hospitalized patients by explainable AI

BETTER PATIENT CARE BY AI DECISION SUPPORT ?

We have developed an explainable AI model that predicts sepsis and lung failure at early stages of disease, which may reduce morbidity and mortality. Successful implementation and clinical acceptance are needed in the translation to improved patient care.


Artificial Intelligence in Medicine
Volume 104, April 2020, 101820

Early detection of sepsis utilizing deep learning on electronic health record event sequences

Simon Meyer Lauritsen [a, b], R. Kl, Mads Ellersgaard Kalar [a], Emil Lund Kongsgaard [a], Katrine Meyer Lauritsen [b, c], Marianne Johansson Jørgensen [d], Jeppe Lange [b, c], Bo Thiesson [a, c]

Show more

https://doi.org/10.1016/j.artmed.2020.101820

Under a Creative Commons license

Get rights and content

open access

PubMed ID: 32498999


nature communications

Explore our content · Journal information

nature > nature communications > articles > article

Article | Open Access | Published: 31 July 2020

Explainable artificial intelligence model to predict acute critical illness from electronic health records

Simon Meyer Lauritsen, Mads Kristensen, Mathias Vassard Olsen, Morten Skaarup Larsen, Katrine Meyer Lauritsen, Marianne Johansson Jørgensen, Jeppe Lange & Bo Thiesson

Nature Communications **11**, Article number: 3852 (2020) | Cite this article

3267 Accesses | **11** Altmetric | Metrics

PubMed ID: 32737308


npj | digital medicine

Explore content · About the journal · Publish with us

nature > npj digital medicine > articles > article

Article | Open Access | Published: 15 November 2021

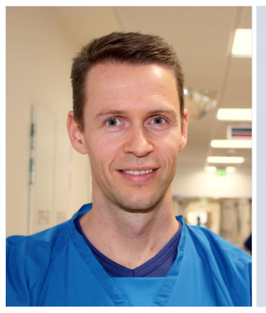
The *Framing* of machine learning risk prediction models illustrated by evaluation of sepsis in general wards

Simon Meyer Lauritsen, Bo Thiesson, Marianne Johansson Jørgensen, Anders Hammerich Riis, Ulrick Skipper Espelund, Jesper Bo Weile & Jeppe Lange

npj Digital Medicine **4**, Article number: 158 (2021) | Cite this article

1010 Accesses | **1** Altmetric | Metrics

PubMed ID: 34782696


Ulrick Skipper Espelund

ulresp@rm.dk


Eva Ladekjær Larsen

evalla@rm.dk


Gitte Kjeldsen


Marianne Johansson Jørgensen

mariajrg@rm.dk

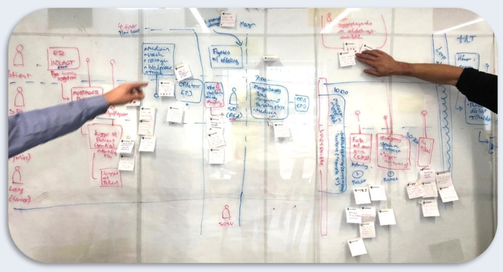
A HUMAN CENTERED PARTICIPATORY APPROACH

By use of an iterative and interdisciplinary process involving clinicians and the entire development team, we aimed at the best possible adaption of the algorithm and its application to meet bed-side clinical needs. We found that:

- Notifications should be available on a hand-held device.
- Subsequent information should be presented in a tailored application.
- Symbols and texts in the application must be aligned with existing terms and concepts used in the EHR.
- The format of patient-specific AI explanations derived from the model requires careful consideration.

MULTI-DISCIPLINARY DEVELOPMENT TEAM

Healthcare researchers, anthropologists, registered nurses, medical doctors, data engineers, UX designers.



PREREQUISITES FOR GOOD CLINICAL FEEDBACK

Well-prepared development team.

A shared perception of the clinical setting in which the model is to be used.

Hands-on sessions.

Coffee. A lot.

Interested clinical staff.

Carbohydrates.

Support from Head of Dept.

Disinfectants.

A THREE-STEP DEVELOPMENT PROCESS TO ENABLE CLINICAL TRANSLATION

A schematic overview of the methods and activities used in the +priokritisk project to prepare for a successful clinical translation.

Model development and evaluation

Framing critical disease
Determining data sources
Training the model
Evaluating by use of AUROC

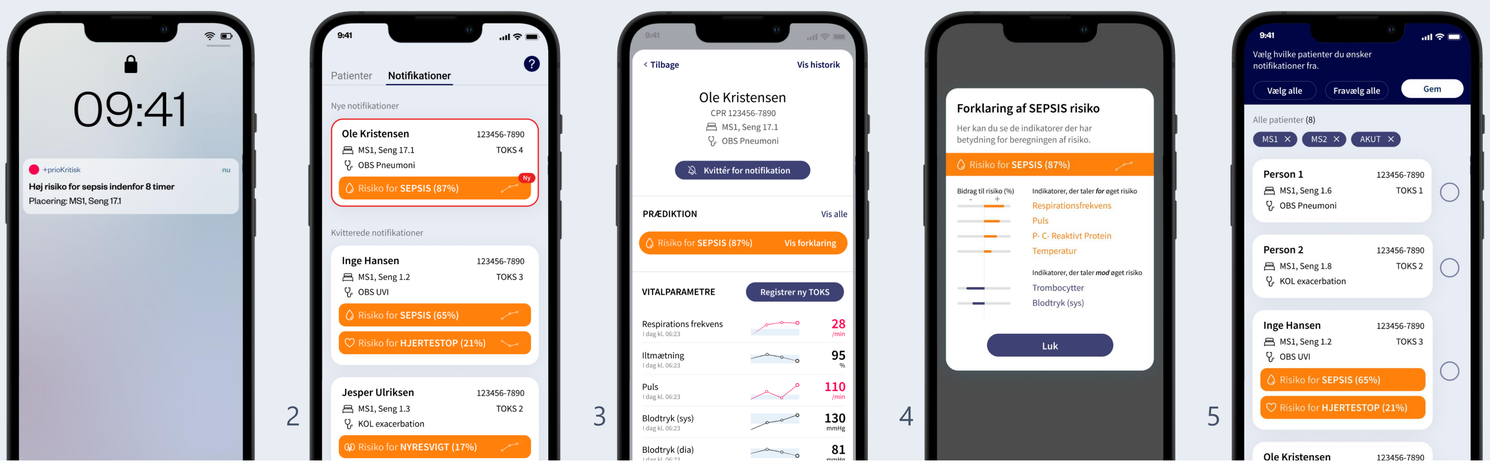
Adaptation to a clinical setting by ethnographic methodology

Where (medical departments)
How (possible solutions and actions)
Who (Professions)

Application development by design sprint, clinical tests and feedback sessions

Mapping work flows and patient trajectories
Sketching the application
Testing the application
Considering explainability format
Adjusting the application

USER INTERFACE OF THE TAILORED APPLICATION



NEXT STEPS AND PERSPECTIVES

- Establish a dataflow from the EHR to the prediction engine.
- Describe the performance of +priokritisk during a test-phase.
- Re-iterations of the AI model and its application.

- Full-scale implementation in selected departments.
- Clinical translation by quantitative and qualitative research methods.
- Model extension to other disease entities.
- Commercialization.

Eva Ladekjær Larsen (anthropologist, PhD, associate professor), Department of Research, Horsens Regional Hospital, Denmark. **Ulrick Skipper Espelund** (MD, PhD associate professor), Department of anesthesia and intensive care, Horsens Regional Hospital, Denmark. **Simon Lauritsen** (MSc, PhD), Head of Life Science Lab at Enversion a/s, Aarhus, Denmark. **Bo Thiesson** (MSc, PhD, honorary professor), President of AI and CTO at Enversion a/s, Aarhus, Denmark. **Jeppe Lange** (MD, PhD, associate professor), Deputy head of department at Department of Clinical Medicine, Aarhus University, Denmark. **Gitte Kjeldsen** (MSc), Senior project lead at Danish Life Science Cluster, Aarhus, Denmark. **Marianne Johansson Jørgensen** (RN, PhD), Director of research at Horsens Regional Hospital, Denmark.

CAAIR HEALTH
Center of Applied Artificial Intelligence Research and Innovation

TVÆRSPOR

AARHUS UNIVERSITET

midt regionmidtjylland

enversion

Danish Life Science Cluster

Innovationsfonden