

PATIENT STRATIFICATION & OUTCOME PREDICTION IN INTENSIVE CARE MEDICINE

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BACKGROUND

The most critically ill patients in our health care system are treated in the intensive care unit (ICU). Here, monitoring devises gather a wide range of physiological information every second, which together with clinical, administrative and laboratory information makes the ICU the most data intensive ward at any hospital. In addition to the data intensity and disease severity, patients display a highly heterogeneous disease background, altogether placing the ICU as an extremely complex clinical environment

AIM The complexity, heterogeneity and lack of effective interventions together with the massive amount of data represents an opportunity to use data mining techniques for better patient stratification and care delivery in the ICU

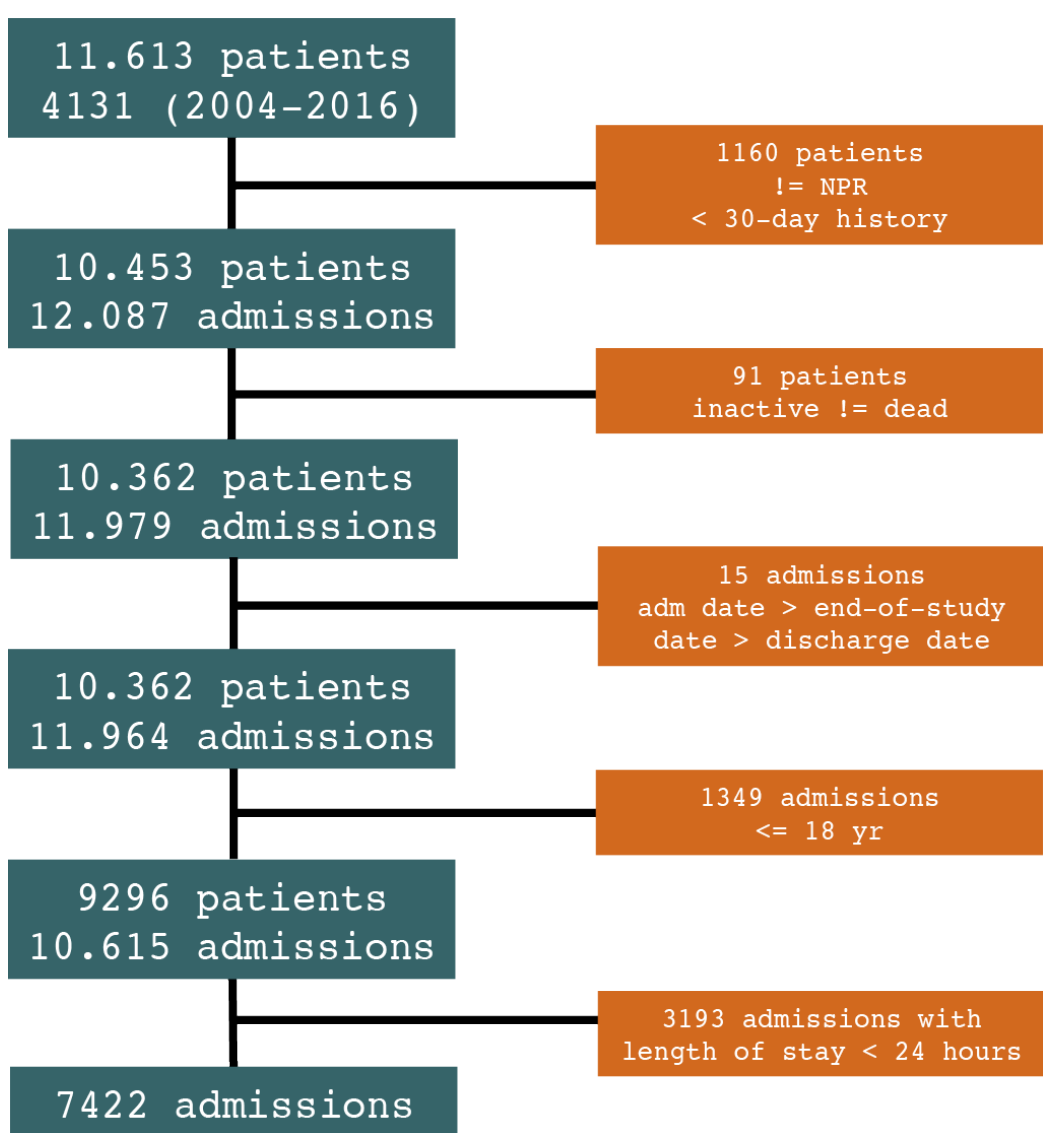
COHORT & DATA

Based on routinely collected information in the electronic medical records (EMRs), fine-grained patient phenotypes will be characterized and patient stratification approaches will be applied to identify subgroups of patients with different treatment outcomes

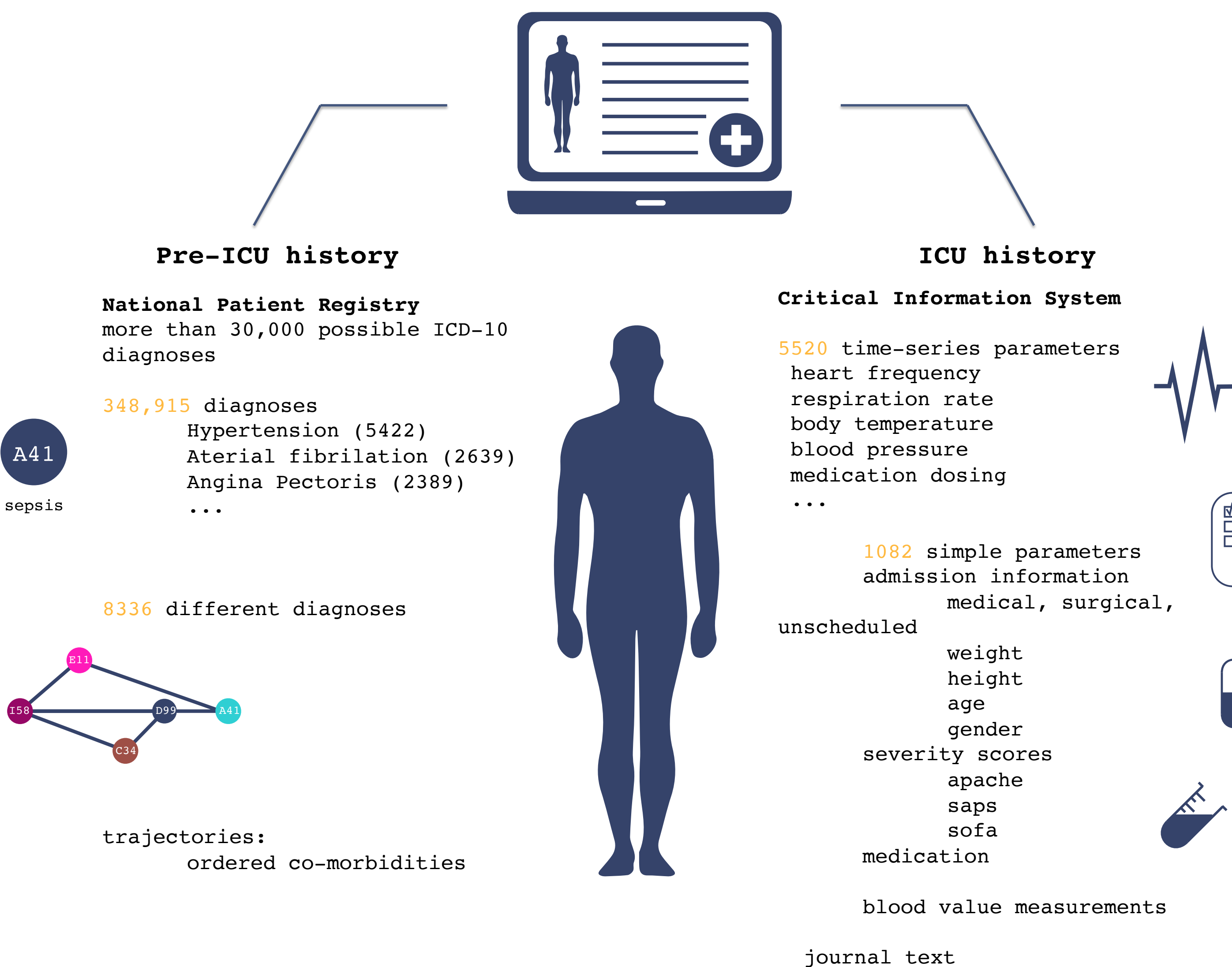
The study population consists of 11.163 intensive care patients admitted to the Danish capital region ICU (afd. 4131) in the period November 2004 to June 2016

Information about more than 20 years of pre-ICU health history is obtained from the National Patient Registry

Information about the ICU stay itself is obtained from the Critical Information System used by the ICU between 2004 and 2016



Electronic Medical Record

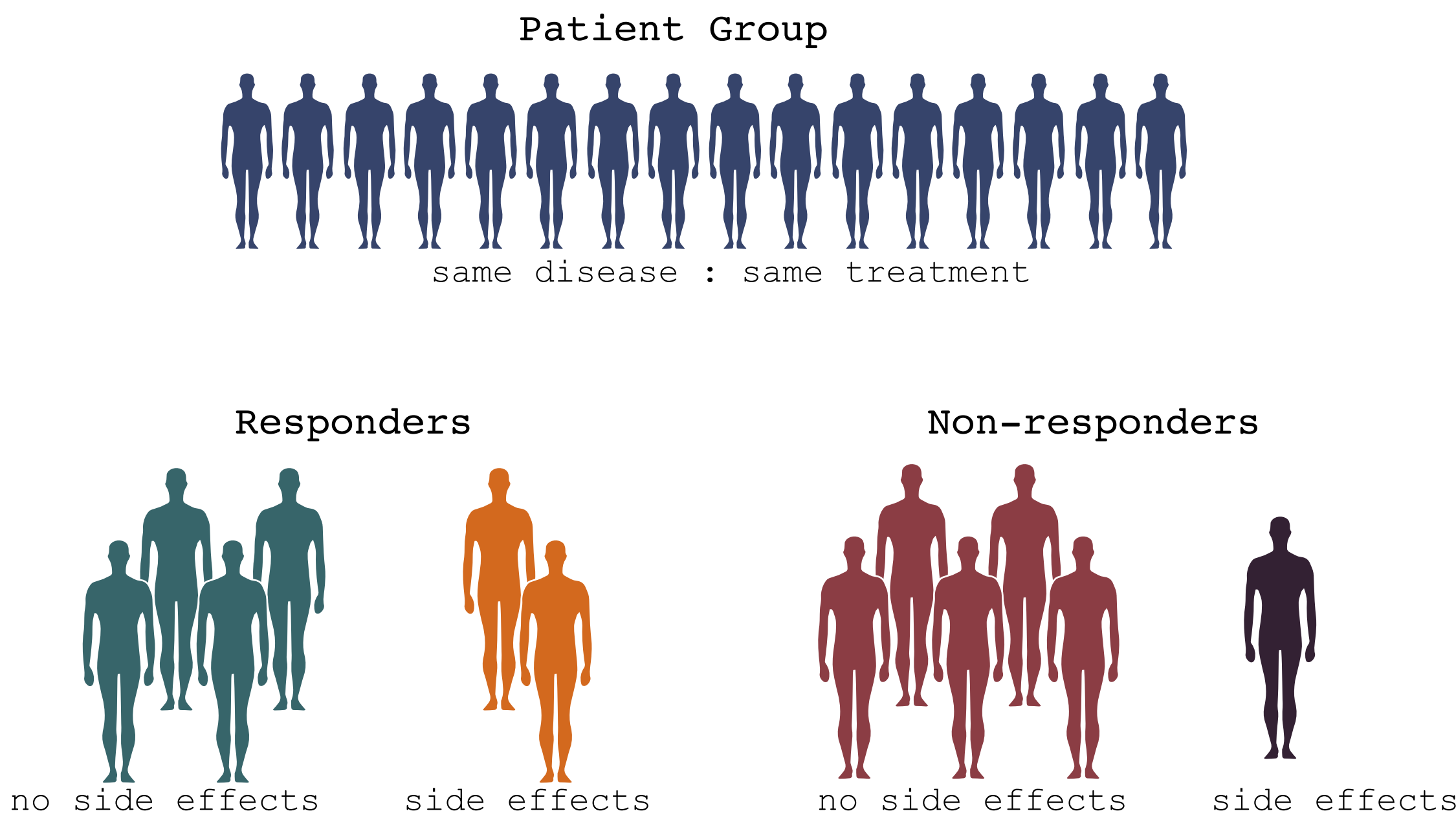


In Denmark, the conditions for registry based research are unique due to the comprehensive and population-wide collection of electronic health care data

STRATIFICATION CONCEPT

Treating the most critically ill patients in our health care system is a highly complicated task due to the severity and heterogeneity of the patient population. Patient stratification will help to identify more homogeneous subpopulations, who have similar treatment responses

With no stratification everyone with the “same disease” get the same treatment..



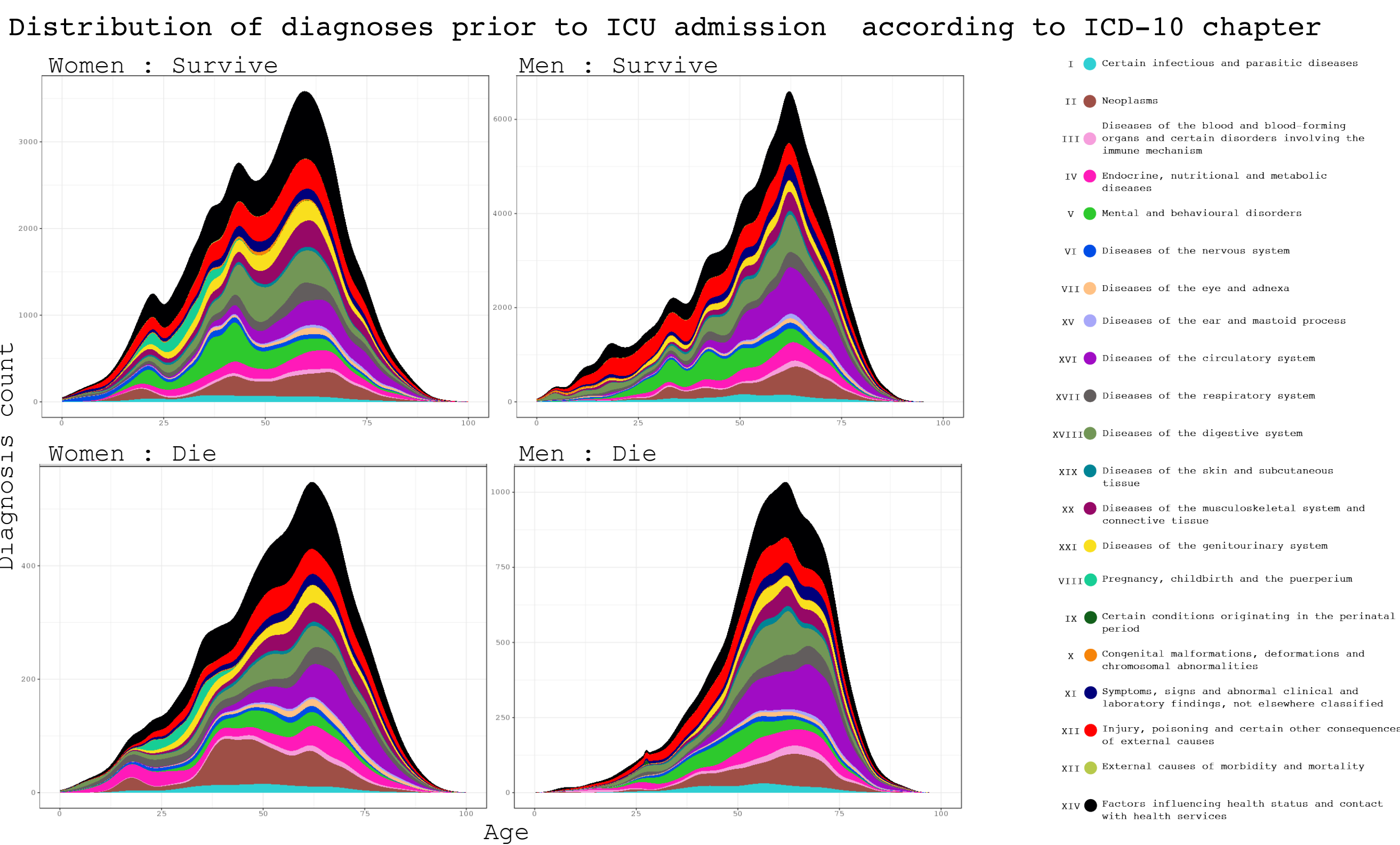
.. even though subpopulations differ in response to treatment.

We believe that the failure of clinical trials in this medical area can partly be explained by the lack of stratification

METHODS & RESULTS

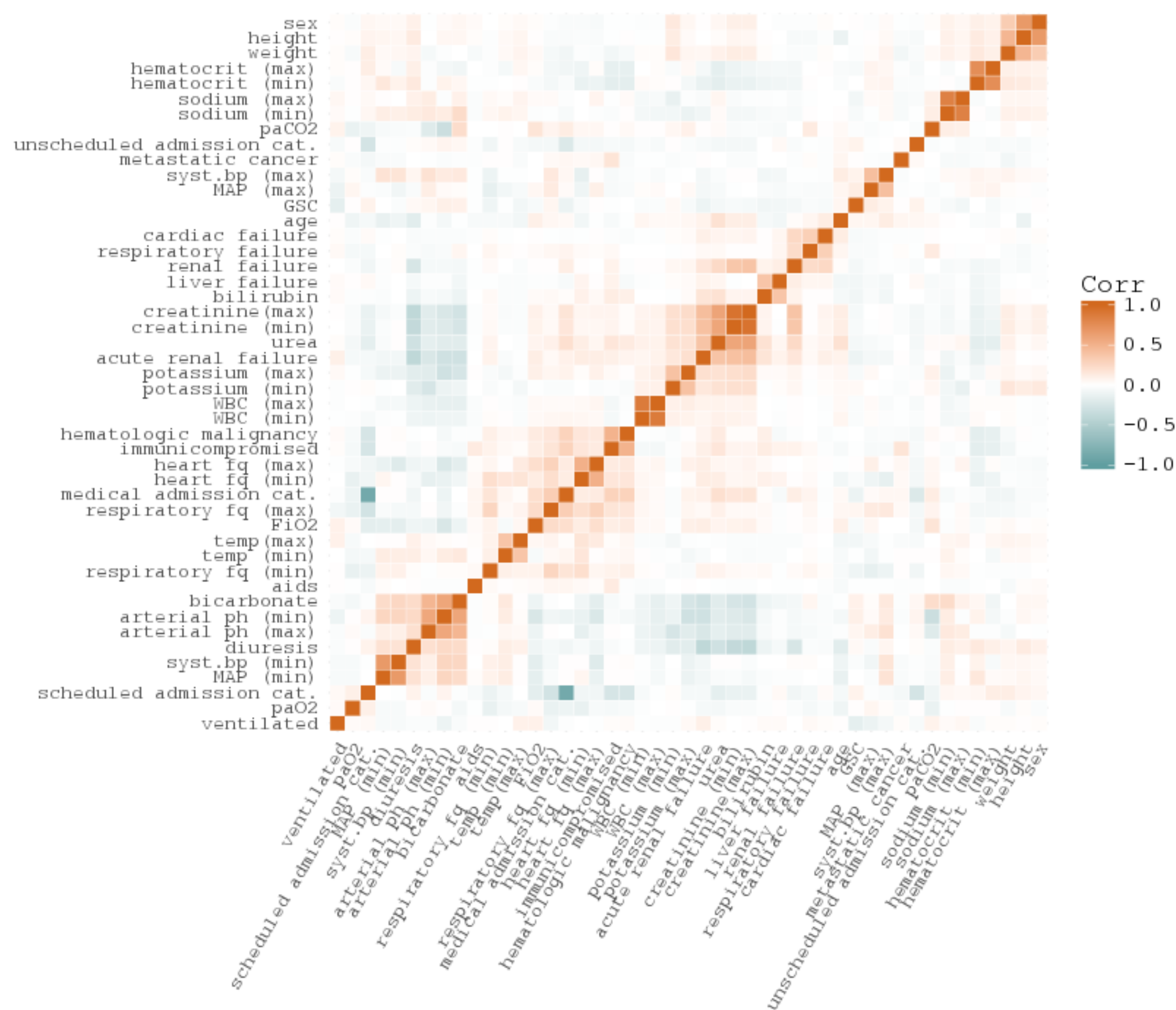
Currently, scores used for patient stratification at the ICU are based on few variables collected upon ICU admission. In this project we develop new scores for patient stratification and outcome prediction in a data driven manner based on

1. long-term disease history prior to admission:



2. high-frequency physiological data from bed-side monitors
3. and clinical measurements taken at the ICU

Heatmap of clinical- and high-frequency parameters



ONGOING Diagnosis history prior to ICU admission and within-admission information is currently being integrated into new patient similarity measures and outcome stratification models

PERSPECTIVES Discovery of correlations between benefits or risks from treatment and specific patient subgroups by these models, can potentially be implemented in decision support systems, where knowledge about successes and failures of past patients can be used to evaluate treatment options for a similar newly admitted patient