Predicting complications after surgery for colorectal cancer

Identifying patients at risk

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INTRO:

Postoperative complications after colorectal cancer surgery are a major driver of short- and long-term morbidity and mortality.

Postoperative complications are graded by severity using the **Clavien-Dindo scale**, where complications requiring **surgery, ICU admission** or **death are graded ≥ 3B**.

Identifying patients at higher risk can allow for **better preoperative planning** by the surgeon, as well as **inform patients on their individual risk** for surgical complications.

METHODS

A CDM was built from all data from the **validated Danish Colorectal Cancer Group (DCCG) Database**, containing **all colorectal cancer surgeries in Denmark since 2001**. ATLAS, R and the OHDSI Patient-level Prediction package was used to create a prediction model using preoperatively available variables to **predict complications 30 days after colorectal cancer surgery**. Preoperative variable domains comprised conditions, measurements, procedures, observations and custom covariates of age groups and specific scales (e.g. ASA and Performance Score). Different models were constructed, wherein **Lasso Logistic Regression** was selected due to it performing best, **split by person and 25% used** for the testing set.

11.7%

RESULTS

- From **2014-2019, 23.738** patients underwent **surgery for colorectal cancer in Denmark**
- **2.781 patients (11.7%)** experienced a **Clavien-Dindo complication grade ≥ 3B.** The PLP was able to predict patients at elevated risk using 77 out of 156 only preoperatively known covariates with postoperative complications with an **AUC = 0.675 (0.654-0.679) and AUPRC = 0.227**

Predicting the **occurrence of complications** after **surgery** for colorectal cancer using only **preoperative variables** is **not yet** up to a sufficient standard for use in a clinical setting.

Model **improvement is needed** to predict risk accurately to aid in clinical decision-making and **identify patients** that might benefit from

stoma creation

pre-habilitation

increased postoperative monitoring

The DCCG database model

Target cohort (T): Patients undergoing colorectal cancer surgery
Outcome cohort (O): Patients experiencing a CD3B or higher complication
Time at risk (TAR): 30 days

Clinical use of prediction models

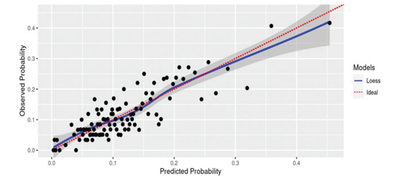
A patient's individual prediction can be used in the multidisciplinary team (MDT) meeting prior to surgery as well as with the patient in a preoperative discussion on treatment planning.

Patients at high risk for postoperative complications could either undergo 'pre-habilitation' to **become 'more fit' prior to surgery**, receive a (temporary) diverting stoma or also be monitored more closely after surgery where any deviation from the normal trajectory could mean a quick initiation of antibiotics or ordering scans or blood tests.

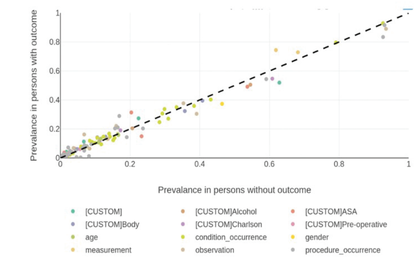
Setting the threshold of when a 'risk is too high' and which treatment to perform must be discussed by the surgeon and individual patient prior to surgery and should be based on the combined risks and benefits of the available prediction models.

Perspectives

Utilizing further data sources containing more in depth phenotypic data might ameliorate prediction models to a standard where they can be **used routinely in the clinical setting.** External validation is planned within the OHDSI community.



Calibration plot of testing set



Prevalence plot of variables in persons with and without outcome

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