



eHealth
week

11 - 13 MAY 2015
RIGA, LATVIA

ORGANISED BY

Ministry of Health
of the Republic of Latvia



USING THE DATA WE HAVE WHAT COULD POSSIBLY GO WRONG?

Stein Olav Skrøvseth

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INTRODUCTION

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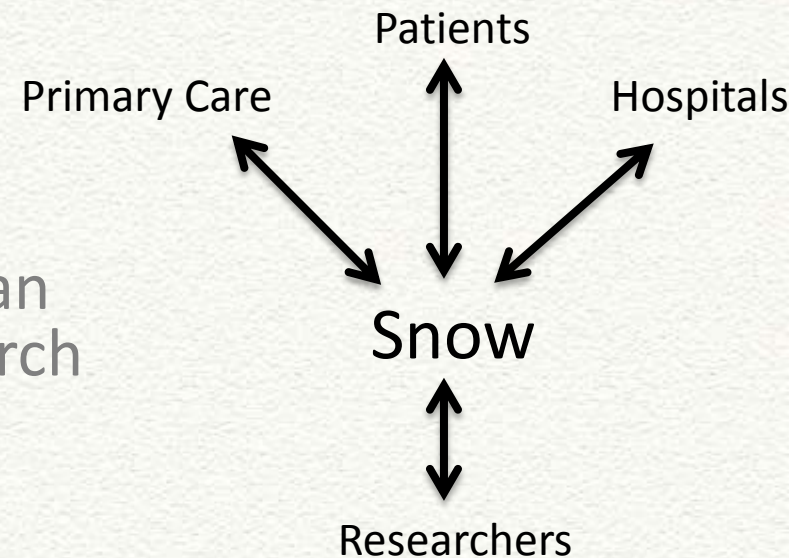


What data do we already have

- Clinical data (EHR)
- Personal data (devices, sensors)
- Public data sources
- Social media
- Geographic data
- ...etc!

How do we get to the data?

- Access to clinical data has substantial barriers for access.
- Technical barriers often insurmountable.
- SNOW HRI: An national Norwegian infrastructure for access to research data from
 - Hospital and GP EHRs
 - Patients' own data





DATA

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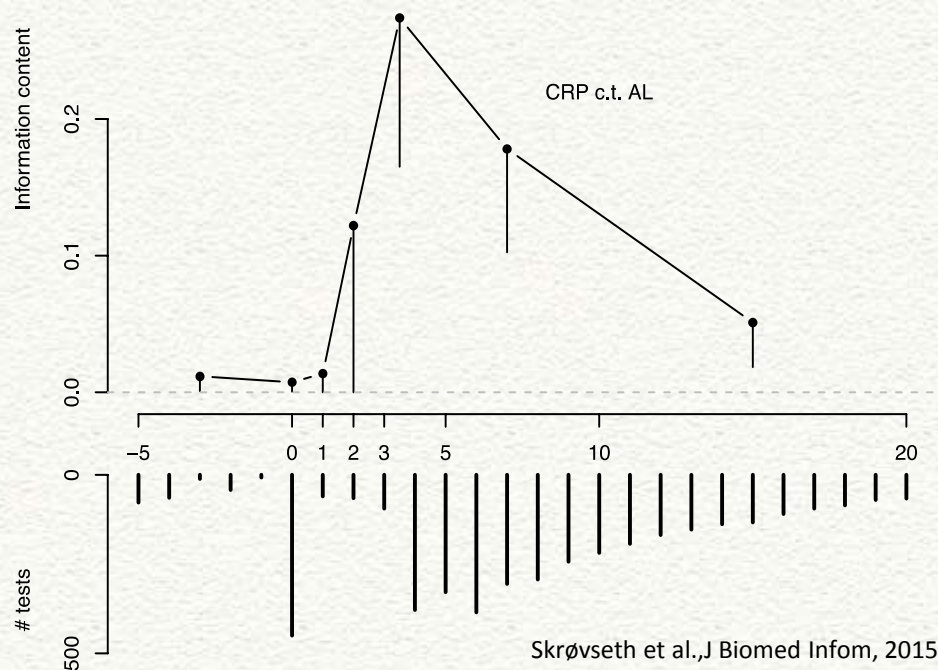


Data Quality

- Clinicians often (justifiably) worried about data quality.
- All manually recorded data will have quality issues.
- Automated recordings are not flawless.
- Error types; positive and negative, spurious.

Good data

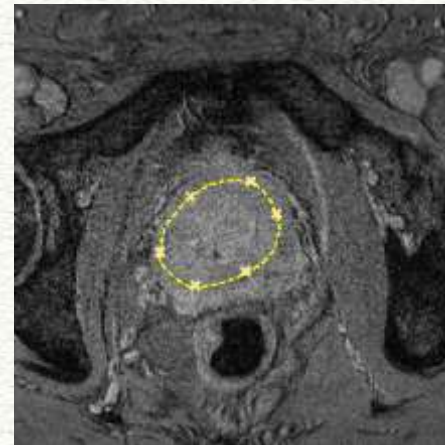
Ex laboratory results: certified, easy to analyze



Good data, bad data

- Some data are “correct”, but hard to analyze.
 - Text : Natural Language Processing
 - Image : Image analysis

Pasienten hadde ryggplager over flere år, men fra mars ned i begge leggene helt ned til tærne. Mest på venstre dominans. Gradvis forverret og redusert funksjonsnivå. er operert for sårruptur og har gjennomgått en lungeembo å Neurontin og hatt bedring av sine plager ut i venstre gen glutealt og på yttersiden og framsiden i leggen. MR som årsak til plagene. Selv om pasienten har blitt noe t tydelige høyresidige radikulære symptomer. Vi planleg formert om hvordan inngrepet gjennomføres, og de vanlig n først og fremst på høyre side, og dersom vi får god t ld, er dette sannsynligvis tilstrekkelig. Vi gjøre derf



Schulz et al., BMC Med. Imag, 2014

What's in the text?

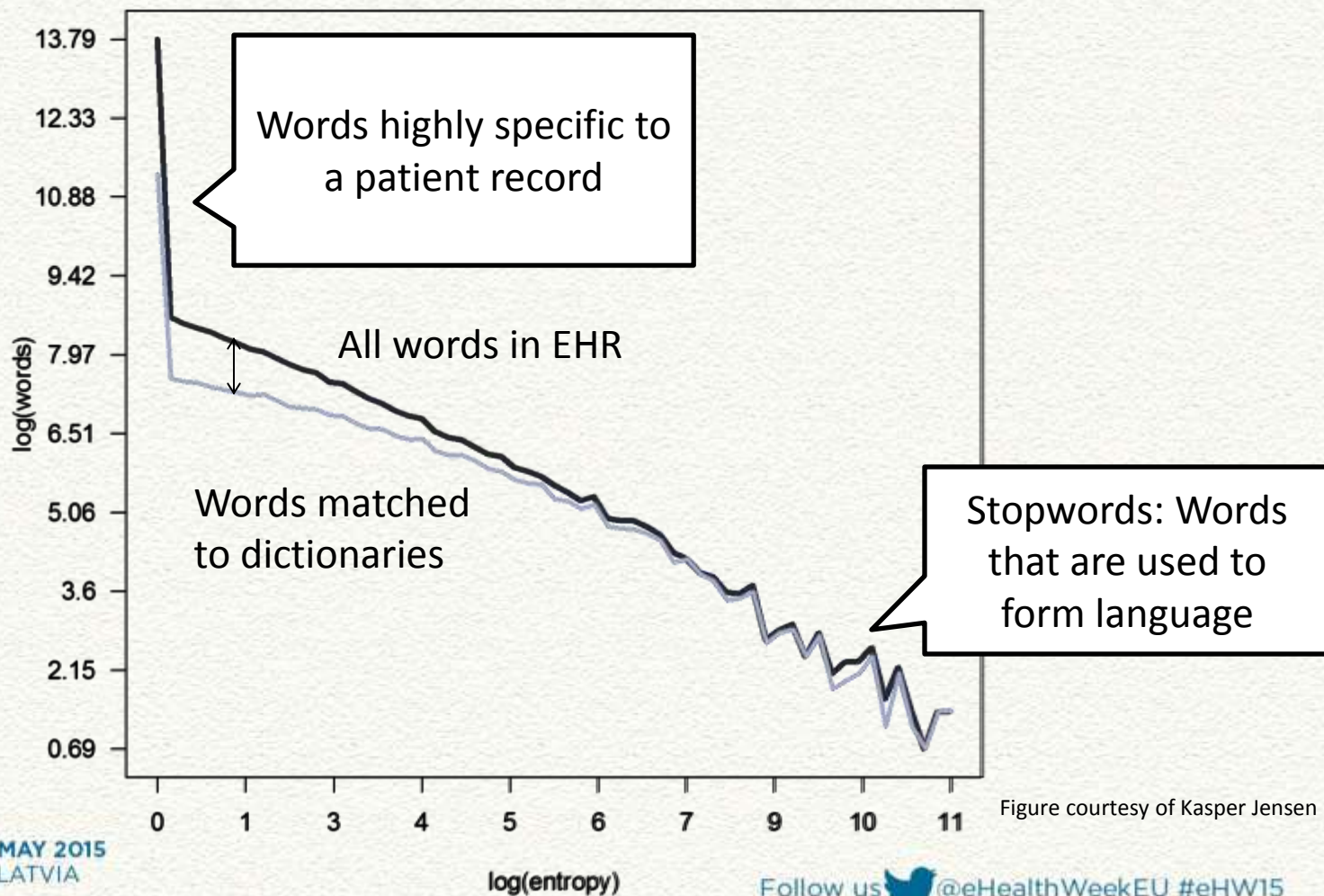
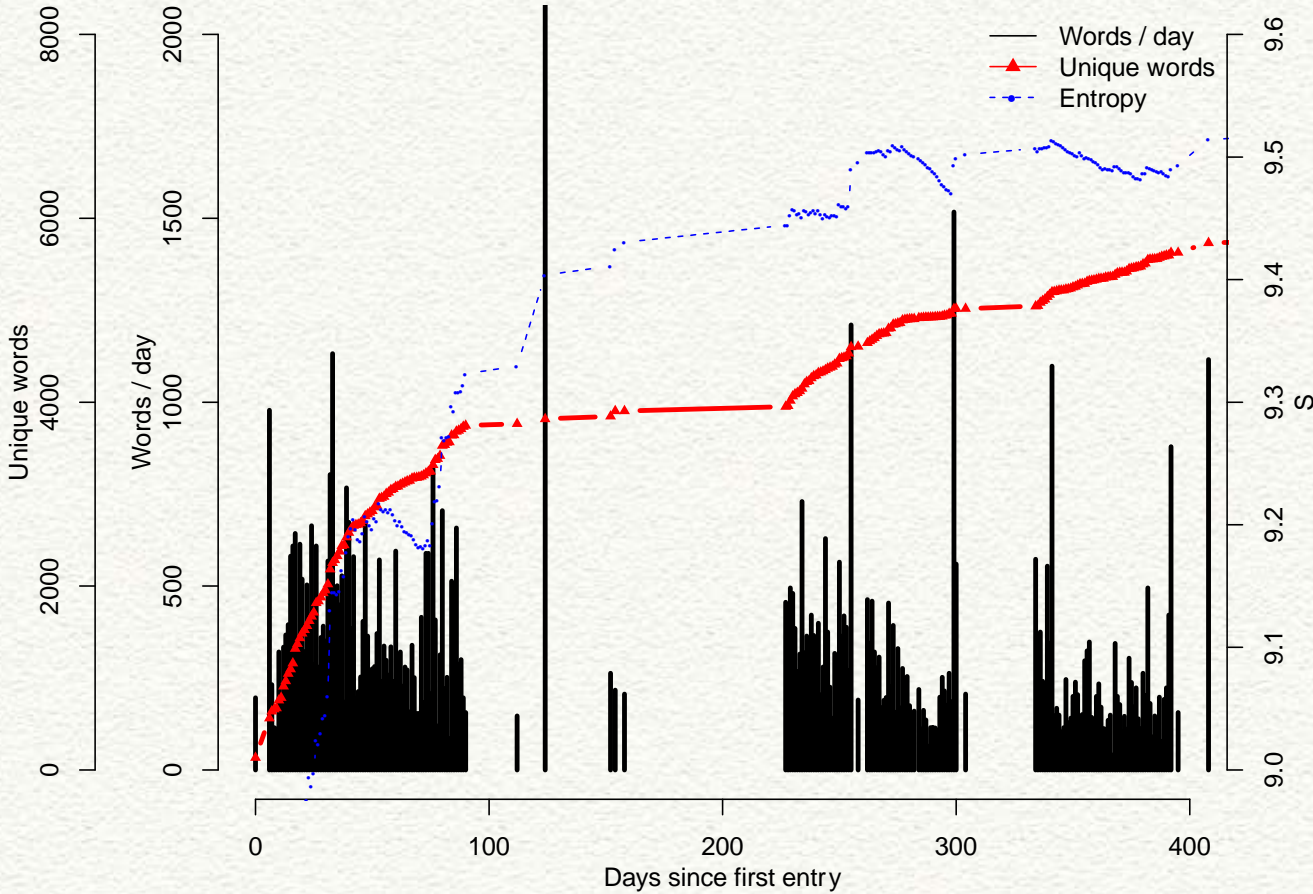


Figure courtesy of Kasper Jensen

Even if data were correct, we don't know it all.





ANALYSIS

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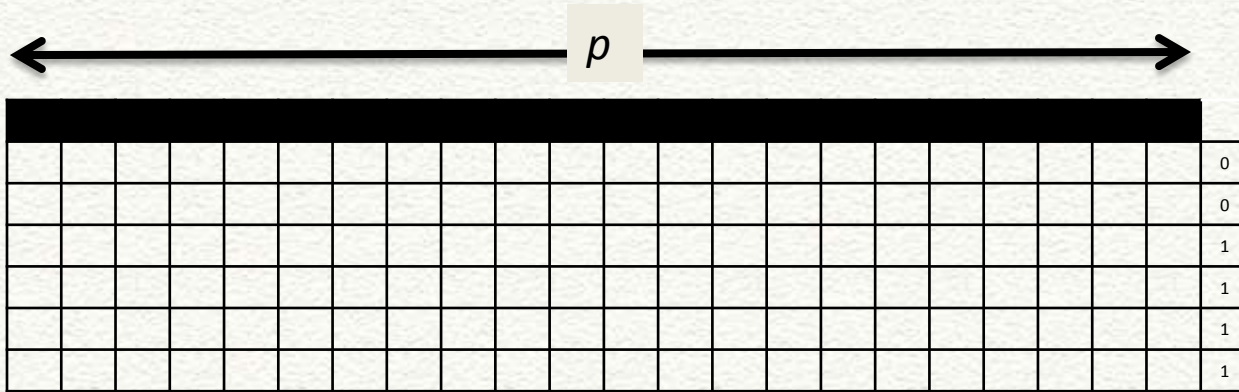
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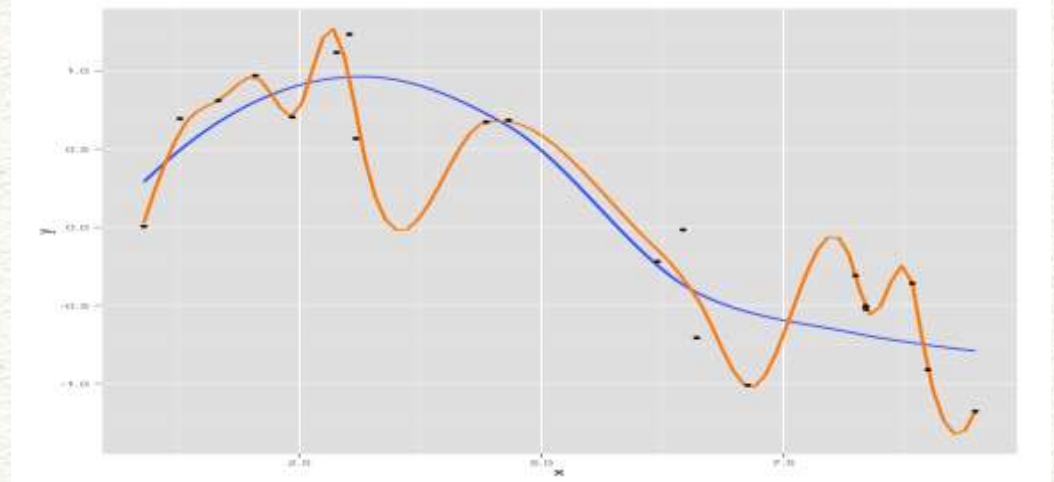


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Large p , Small N



“Big data” or “long, thin data”?

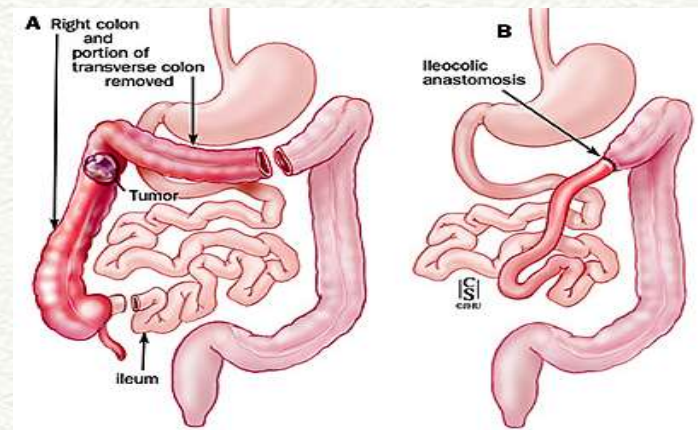


Statistical learning

- Learn patterns adaptively from data.



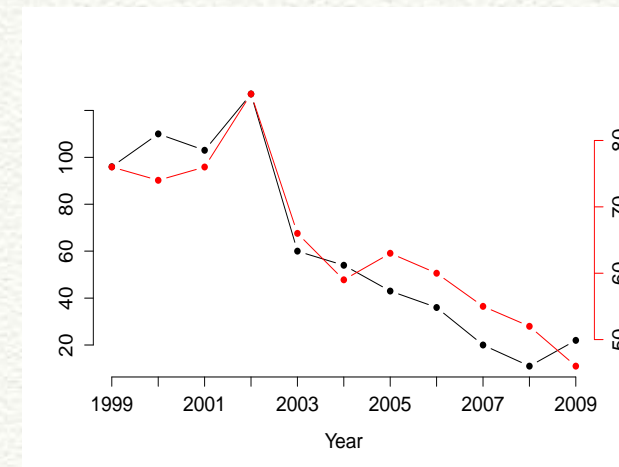
Zortea et al., Artif. Intelligence Med, 2014



Soguero-Ruiz et al., IEEE J Biomed Health Inform, 2015

Observational data

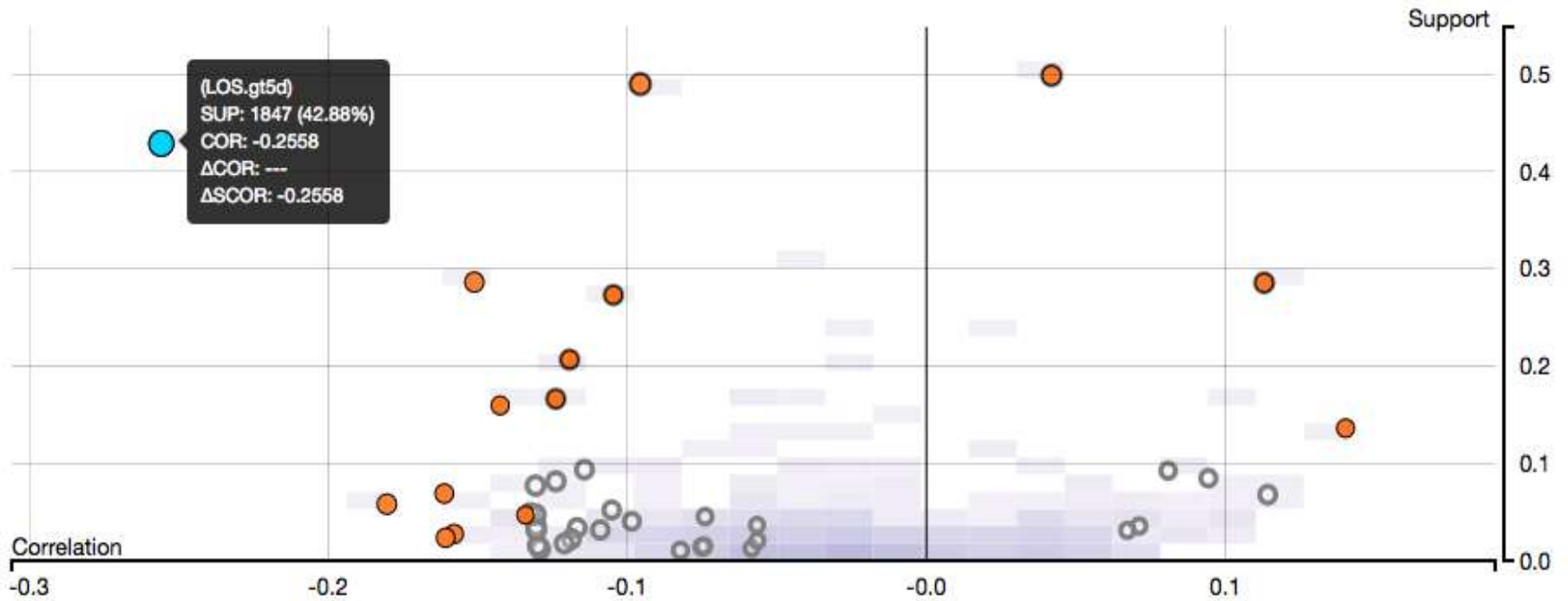
- Biases unavoidable
 - Propensity scores – “simulate RCTs”
 - Can only adjust for what we know and measure
- Causality
- Validation – internally or externally
 - Cross validation
 - Good models of actual performance?



The disconnect

- Using a quantum physicist as an analyst?
- Those who generate data are unable to analyze
- Those who analyze lack domain insight
- Iterative cycles of analysis, interactive visual analytics

Refresh Clear Fit | Show Lengths: 1 6 | Highlighted 15 | Show Path | Extremes List Histograms: Real Normalized



Extremes

|Correlation|

- (LOS.gt5d)
- (Immediate_Resurgery)
- Malignant neoplasm of rectum
- (LOS.gt5d);Loop enterostomy
- Loop enterostomy
- (LOS.qt5d);(Aqe.qt60)
- Scheduled procedure;(LOS.gt5d)
- Appendectomy
- (LOS.qt5d);(Immediate_Resurgery)
- Scheduled procedure;One hour or less ;(LOS.gt5d)

- (LOS.gt5d)
- (Immediate_Resurgery)
- Malignant neoplasm of rectum
- Appendectomy
- More than three and less than five hours
- (Jcode)
- Acute appendicitis, unspecified
- (Laparoscopic)
- (Aqe.qt60)
- Reoperation for deep infection in gastroenterological surgery





What can possibly go wrong?

- The “data deluge”...but how do we get the data?
- Hidden biases
- Overfitting to data or sites.
- Causality (but does it matter?)
- Disconnect of analyst & generator



THANK YOU

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