

Quality Assurance in Healthcare with R

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The IQTIG

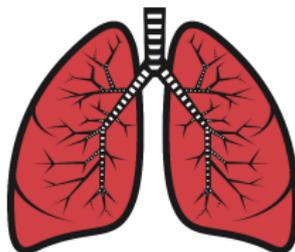
- Central institution for the quality assurance in the German public healthcare system



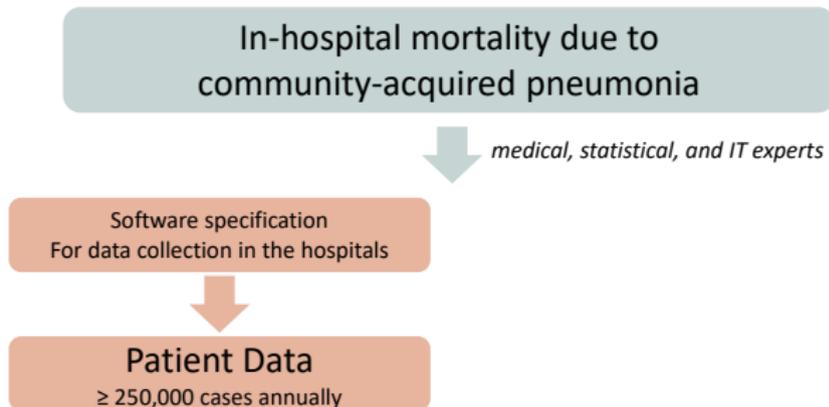
- Founded in 2015

What we do - an example

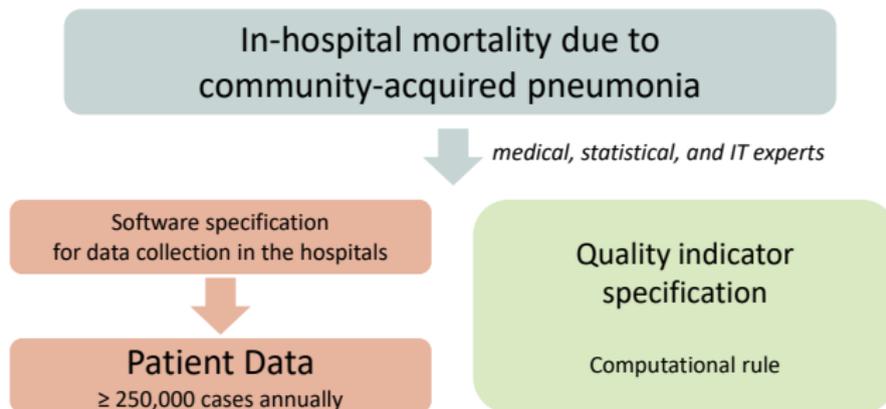
In-hospital mortality due to
community-acquired pneumonia



What we do - an example

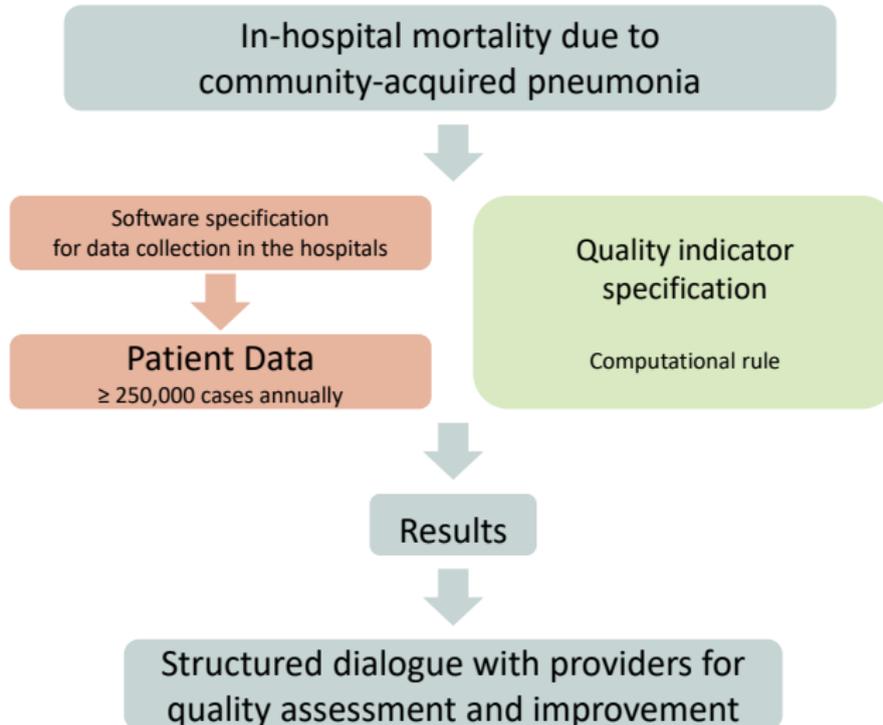


What we do - an example



Software specification and computational rules are publicly available on our website

What we do - an example



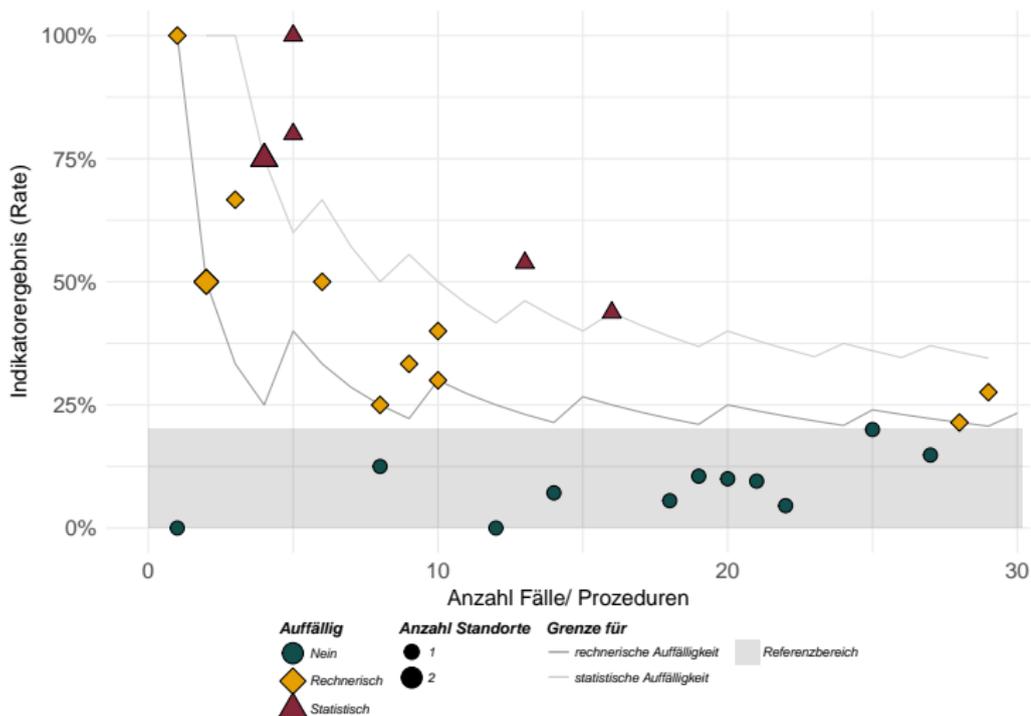
How we use R

At the Medical Biometry and Statistics Unit, we use R

- for ad hoc analysis of data
- for the development of new statistical methodologies
- for internal reporting tools (e.g. shiny)
- in production: packages for automatic computation of results
 - e.g. 21 million numbers for our standard routine report

How we use R

Funnelplots

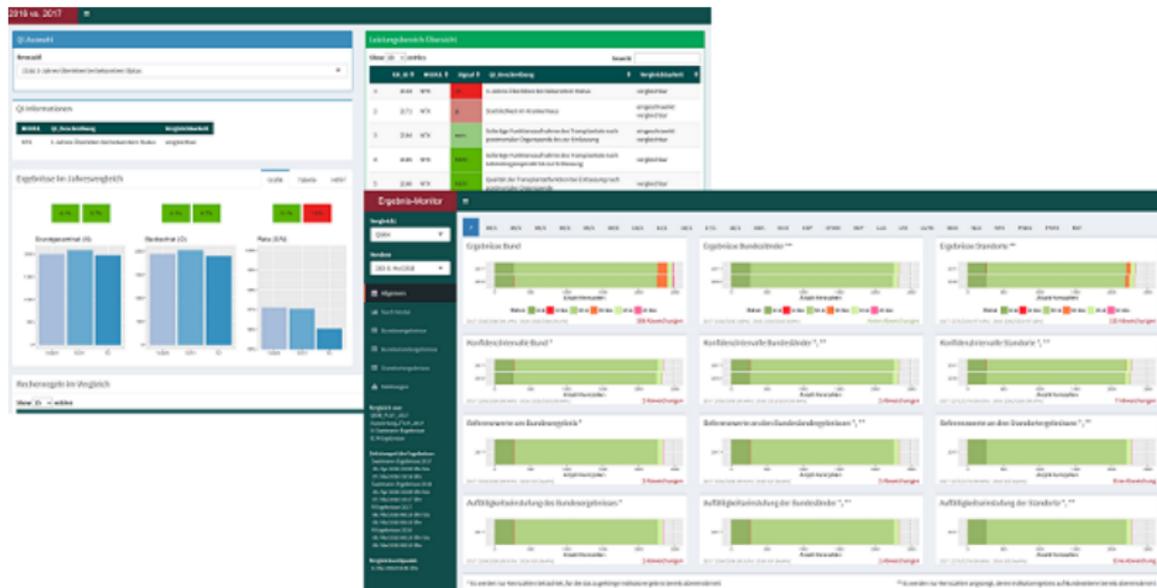


Internal infrastructure

- Statistical analysis is a team effort!
- Code review and automatic tests
- Independent proof-calculation of results
- Aim: Maintain high quality of analyses and published results

Internal infrastructure

- Internal package repository (~10 actively used packages)
- Shiny server:



External transparency

Computation rules for our ~280 quality indicators

- Definition of the relevant sets from the data
- Specification on how to count

- Will be published as R code

External transparency

- Mostly simple Boolean expressions in base R:

```
age >= 18 & blood_pressure >= 140
```

- Special abstractions to make code more compact:

```
diagnosis_code %isAnyLike% ICD$ICD_Infection
```

```
all(postoperative_infect == 0) %group_by% patient_id
```

External transparency

R package IQTIGpvcI

- We recently published our first R package: IQTIGpvcI
- Reference implementation illustrating methodologies for performing hospital classification in the context of uncertainty

External transparency

R package IQTIGpvc

- Available on our website:

Downloads (R-Paket)

**IQTIG – R functions for hospital profiling**

2018 / 09.04.2018 / PDF / 143 KB

**IQTIG – R functions for hospital profiling (Package "IQTIGpvc")**

2018 / 09.04.2018 / GZ / 60 KB

**IQTIG – R functions for hospital profiling (Package "IQTIGpvc" description)**

2018 / 09.04.2018 / HTML / 78 KB

<https://iqtig.org/das-iqtig/grundlagen/biometrische-methoden/>

- Licensed under GPL Version 3

External transparency

Ermittlung statistischer Auffälligkeit

Statistischer Test	Einseitiger exakter Binomialtest basierend auf mid-p-Werten
Signifikanzniveau	$\alpha = 5 \%$
Pseudocode	<code>compute_rate_pvalue(o, n, t, alternative = "greater", midp = TRUE) ≤ 0,05</code>

Example of R code (using `IQTIGpvc`) published in a juristic document (plan. QI directive, G-BA 2016)
https://www.g-ba.de/downloads/62-492-1368/plan-QI-RL_2016-12-15_iK_2017-03-24.pdf

Summing up

- R supports us in our mission to improve healthcare quality in Germany
- R enables us to be more transparent, because it's open source