



# CAPRI

*Our experience with real world data in metastatic prostate cancer*

Malou Kuppen, MD PhD

[malou.kuppen@maastro.nl](mailto:malou.kuppen@maastro.nl)

institute for  
Medical  
Technology  
Assessment



Radboudumc

# Contents

---

1. The use of real-world evidence in CRPC
  - The history: CAPRI 1-2
2. The major challenges
3. Our solutions
  - The present: CAPRI 3
    - *And hopefully the future*

# The use of RWE in CRPC

---

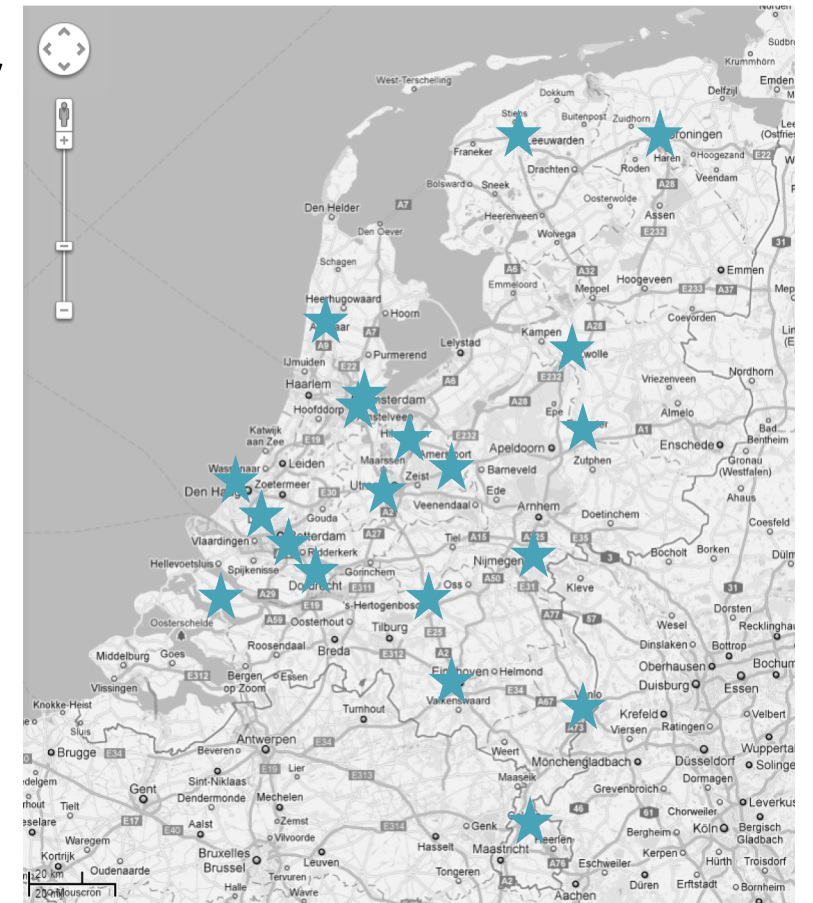
CAPRI 1 & 2

# Our history

## CAPRI

- Investigator-initiated, observational multi-center cohort study
- Retrospective manual data collection
- Founded in 2011, datacollection started in 2012
  - last database cut-off 31-DEC-2017
- PROMS in PROCAPRI side study

Hospitals		Hospitals n=20
Type of hospital		
	University	4
	STZ	11
	General	5





# Our history

---

	CAPRI 1	CAPRI 2	PROCAPRI
<b>Study</b>	Retrospective, observational, clinical data	Retrospective, observational, clinical data	Prospective PROMS
<b>Patients</b>	CRPC 1-1-2010 to 31-12-2012	CRPC 1-1-2010 to 31-12-2015	CRPC 1-1-2010 to 31-12-2015
<b>Population</b>	N=1,524 - 20 hospitals	N=3,616 - 20 hospitals	N=167 - 10 hospitals
<b>Database cut-off</b>	31-12-2014	31-12-2017	31-12-2017
<b>Sponsors</b>	Sanofi, Janssen	Sanofi, Janssen, Astellas, Bayer	ZonMW

# Differences in trial and real-world

---

PROSTATE CANCER | VOLUME 4, ISSUE 5, P694-701, SEPTEMBER 01, 2018

## Differences in Trial and Real-world Populations in the Dutch Castration-resistant Prostate Cancer Registry

[Hans M. Westgeest](#)   • [Carin A. Uyl-de Groot](#) • [Reindert J.A. van Moorselaar](#) • ... [Joan van den Bosch](#) • [Alphonsus J.M. van den Eertwegh](#) • [Winald R. Gerritsen](#) • [Show all authors](#)

Published: October 12, 2016 • DOI: <https://doi.org/10.1016/j.euf.2016.09.008>

# Results

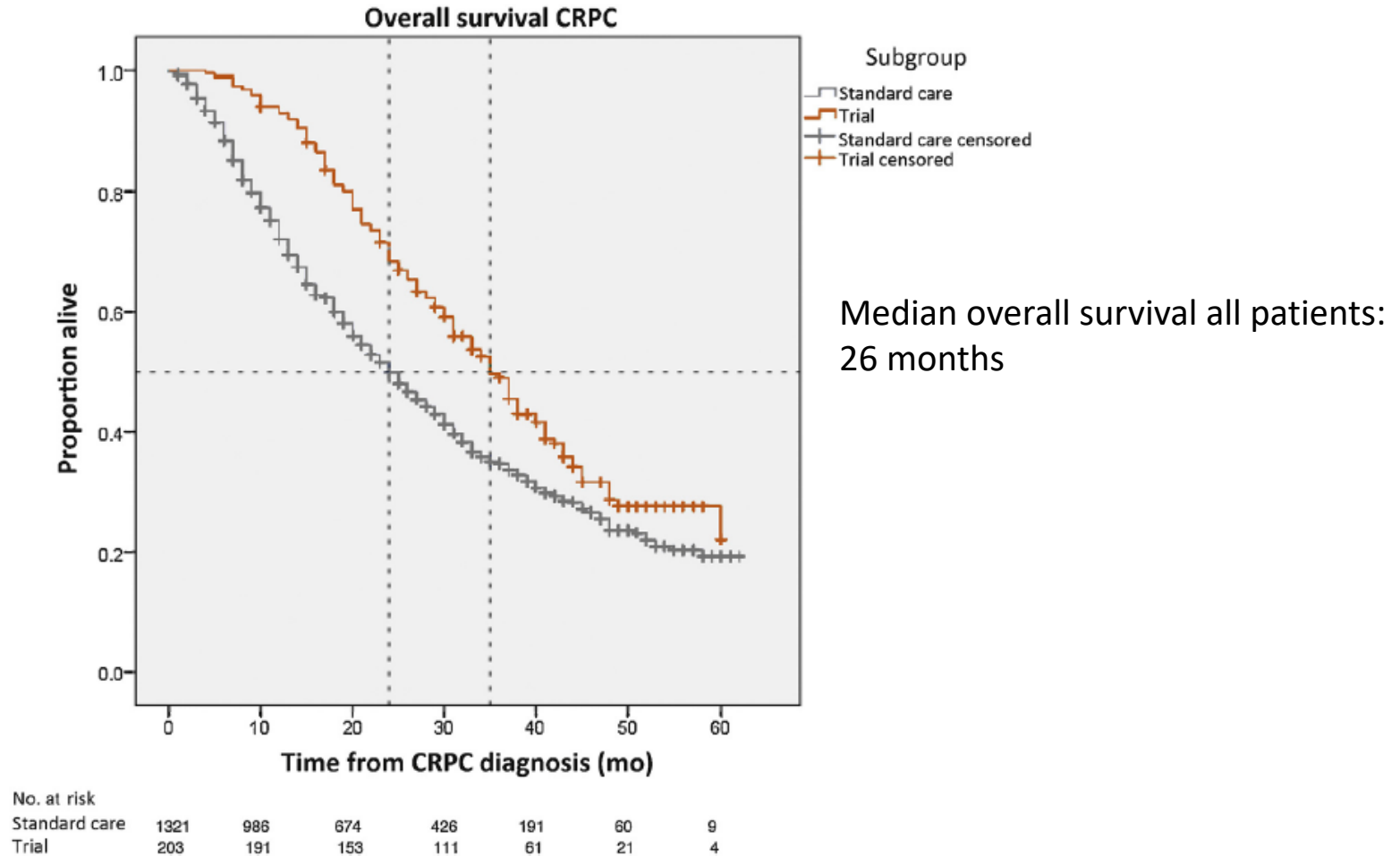


Fig. 2 - Unadjusted overall survival from castration-resistant prostate cancer (CRPC) diagnosis; median overall survival standard care versus trial subgroup 24 months versus 35 months ( $p < 0.001$ ).

# Differences in trial and real-world

---

- Trial patients mainly differed from standard care patients with regards to
  - age (67 vs 76 yr)
  - comorbidity (no comorbidity 76% vs 54%)
  - treatment strategy (docetaxel treatment 85% vs 40%)
- After correction for baseline prognostic factors and treatment effect, this difference in OS between trial and RW was not retained (HR 0.95, p=0.658)

**RWE is complementary to RCTs**

# But many more questions can be answered

---


PROSTATE CANCER | VO

Review – Clinical Oncology | [Open Access](#) | [Published: 17 June 2020](#)

## Differences in T Castration-resis

### A clinician's guide for developing a prediction model: a case study using real-world data of patients with castration-resistant prostate cancer



ORIGINAL STUDY | VOLUME 18




[Kevin M. Veen](#), [Isabel B. de Angst](#) , [Mostafa M. Mokhles](#), [Hans M. Westgeest](#), [Malou Kuppen](#), [Carin A. Uyl-de Groot](#), [Winald R. Gerritsen](#), [Paul J. M. Kil](#) & [Johanna J. M. Takkenberg](#)

[Journal of Cancer Research and Clinical Oncology](#) **146**, 2067–2075(2020) | [Cite this article](#)

## Health-related Qu resistant Prostate Study in the Neth

### Castration-resistant Prostate Cancer Population: Results from the Dutch Castration-resistant Prostate Cancer Registry

[Malou C.P. Kuppen](#)   • [Winald R. Gerritsen](#) • [Carin A. Uyl-de Groot](#)

[Jessica C.L. Notohardjo](#)   • [Malou C.P. Kuppen](#)  • [Hans M. Westgeest](#) • ... [Carin A. Uyl-de Groot](#) • [Winald R. Gerritsen](#) • [Alfons J.M. van den Eertwegh](#) • [Show all authors](#) • [Show footnotes](#)

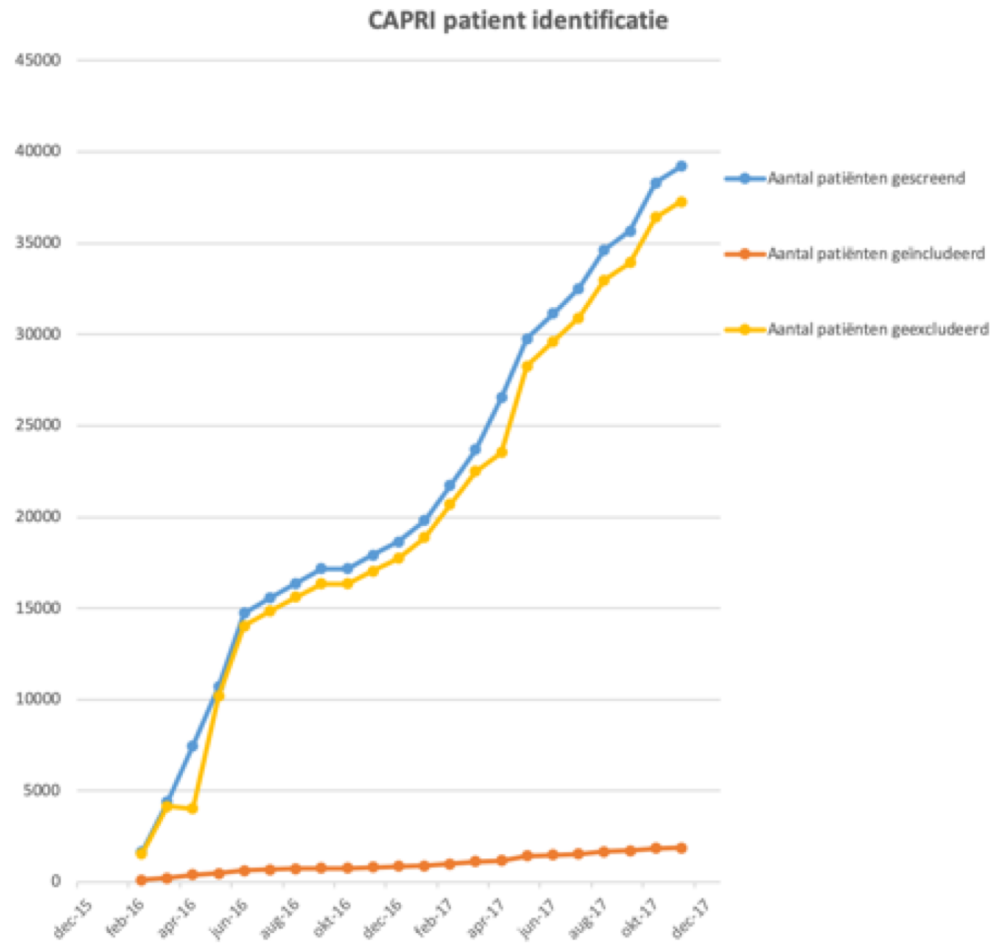
Published: December 04, 20

Published: April 30, 2020 • DOI: <https://doi.org/10.1016/j.euf.2020.03.009>

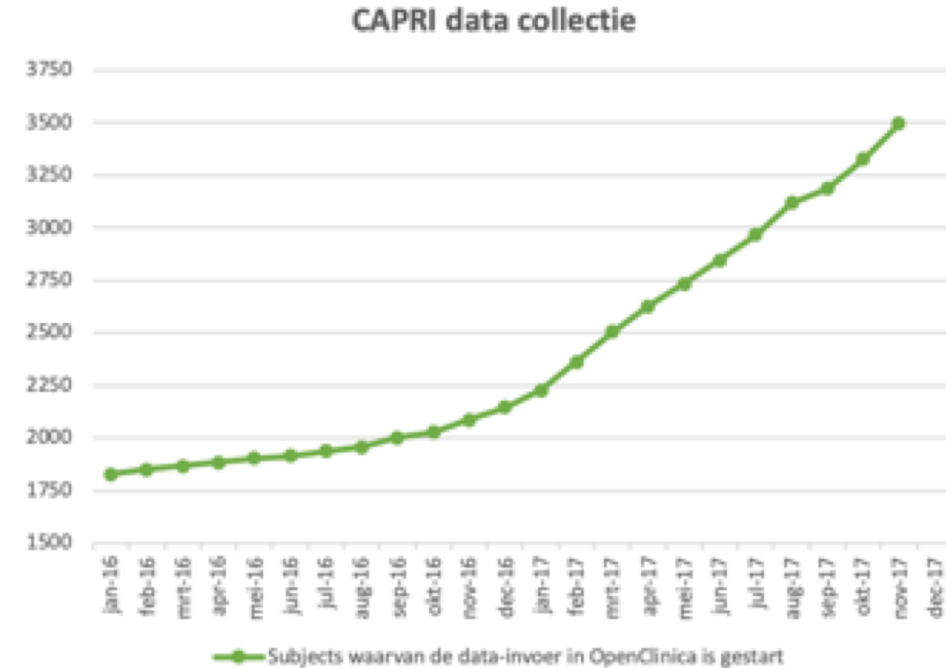
# The major challenges

---

# Data collection

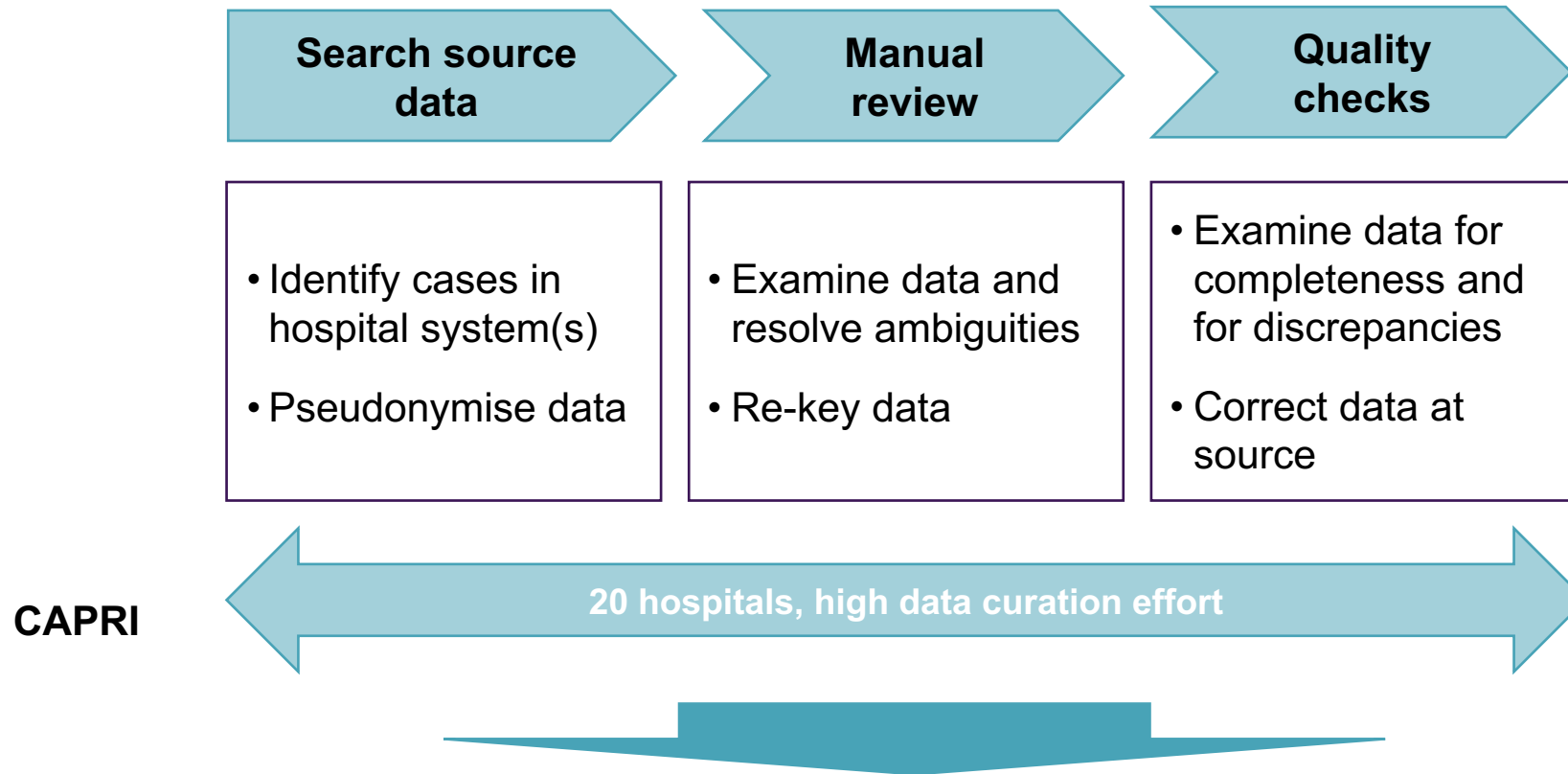


4-5h per patient



# Costly manual curation

---



**Achieving high quality data has been c.80% of CAPRI efforts and cost to date**



# Our solutions

---

CAPRI 3, and hopefully 4, 5, 6 ...

# CAPRI 3

---

- Necessary changes:
    - Easier patient identification
    - Quicker data collection
- AI-driven (semi-automated) data collection using text mining software (CTcue B.V.).



# Does it work?

---



*Article*

## **Reliability and Efficiency of the CAPRI-3 Metastatic Prostate Cancer Registry Driven by Artificial Intelligence**

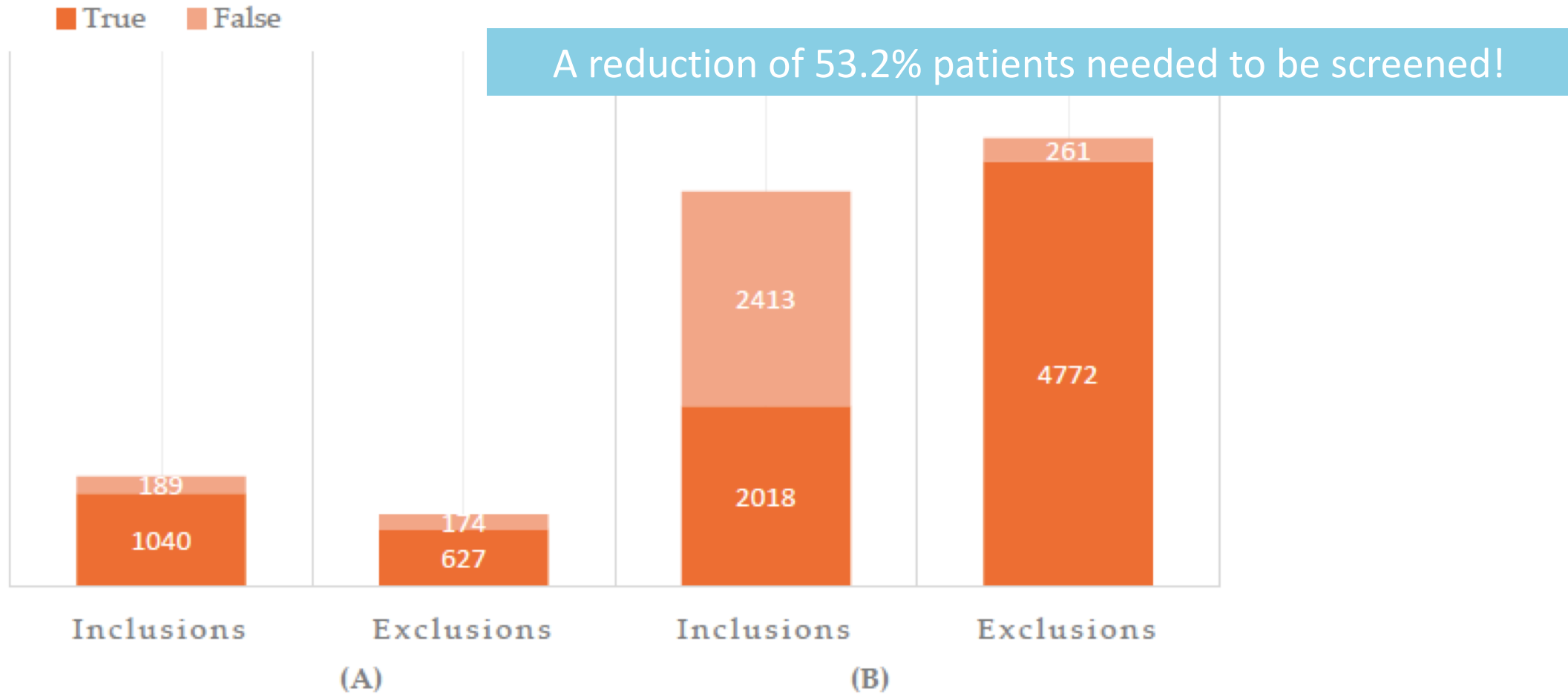
Dianne Bosch <sup>1,\*</sup> , Malou C. P. Kuppen <sup>2</sup>, Metin Tascilar <sup>3</sup>, Tineke J. Smilde <sup>4</sup> , Peter F. A. Mulders <sup>1</sup>,  
Carin A. Uyl-de Groot <sup>5</sup> and Inge M. van Oort <sup>1</sup>

# New workflow

---

## Step 1: Patient identification

- Patients are identified using CTcue software package in two cohorts (mHSPC and CRPC >2016)
- Patients are identified using an algorithm based on multi-step query → **informed consent**
- **Pilot study:**
  1. Creating the search query
  2. Manual validation of all patients
  3. Comparison of number in/exclusion found with query to create algorithm for in/exclusion
  4. Evaluation of reliability of algorithm



**Figure 1.** Manual validation of the patient-identification algorithms. (A) Amount of in- and exclusions in the first pilot in 2019; identified exclusions and remaining identified subjects by the algorithm are summed up as exclusions. (B) Amount of in- and exclusions in the second pilot in 2022.

# New workflow

---

## Step 2: data extraction

- After patient identification, data are extracted using CTcue's Clinical Data Collector after written informed consent
  - Part of the data (i.e. data of less quality) is validated and completed by trained datamanagers
- Data include baseline characteristics, patient parameters during mHSPC and CRPC, next generation sequencing data, biochemical response, serious adverse events, systemic treatments, supportive care, resource use, referral patterns and multidisciplinary treatment consultations

	Manually n = 20	Automated n = 20	Completeness	Accuracy
Date of initial diagnosis, n (%)	20/20 (100)	20/20 (100)	20/20 (100)	2/20 (10) 20/20 (100) <sup>A</sup>
Type of tumor, n (%)	18/20 (90)	18/20 (90)	18/18 (100)	18/18 (100)
Adenocarcinoma	18/20 (90)	18/20 (90)		
Unknown	2/20 (10)	2/20 (10)		
Gleason score, n (%)	18/20 (90)	17/20 (85)	17/18 (94.4) <sup>B</sup>	16/17 (94.1) <sup>C</sup>
6–7	10/20 (50)	8/20 (40)		17/17 (100) <sup>A</sup>
8–10	8/20 (40)	9/20 (45)		
Unknown	2/20 (10)	3/20 (15)		
Weight, n (%)	1/20 (10)	5/20 (25)	5/1 (500)	5/5 (100)
ECOG PS, n (%)	0/20 (0)	1/20 (5)	1/1 (100)	-
PSA, n (%)	20/20 (100)	17/20 (85) 20/20 (100) <sup>D</sup>	17/20 (85) 20/20 (100) <sup>D</sup>	17/17 (100)
Hb, n (%)	14/20 (70)	13/20 (65) 20/20 (100) <sup>D</sup>	13/14 (92.9) 20/14 (142.9) <sup>D</sup>	13/13 (100)

Abbreviations: CAPRI, Castration-Resistant Prostate Cancer Registry; ECOG, Eastern Cooperative Oncology Group; PSA, Prostate Specific Antigen; Hb, Hemoglobin; MDT, Multidisciplinary team; NR, no result. <sup>A</sup> Accuracy after manual validation (i.e., quality control). <sup>B</sup> N = 1 Inaccessible data (pdf file). <sup>C</sup> N = 2 Upgrading of manual data collection (control group). <sup>D</sup> When searched in unstructured text fields. <sup>E</sup> N = 5 Inaccessible data (treated elsewhere). <sup>F</sup> N = 1 Abiraterone treatment in trial. <sup>G</sup> N = 2 Inaccessible data (treated elsewhere).

# New workflow

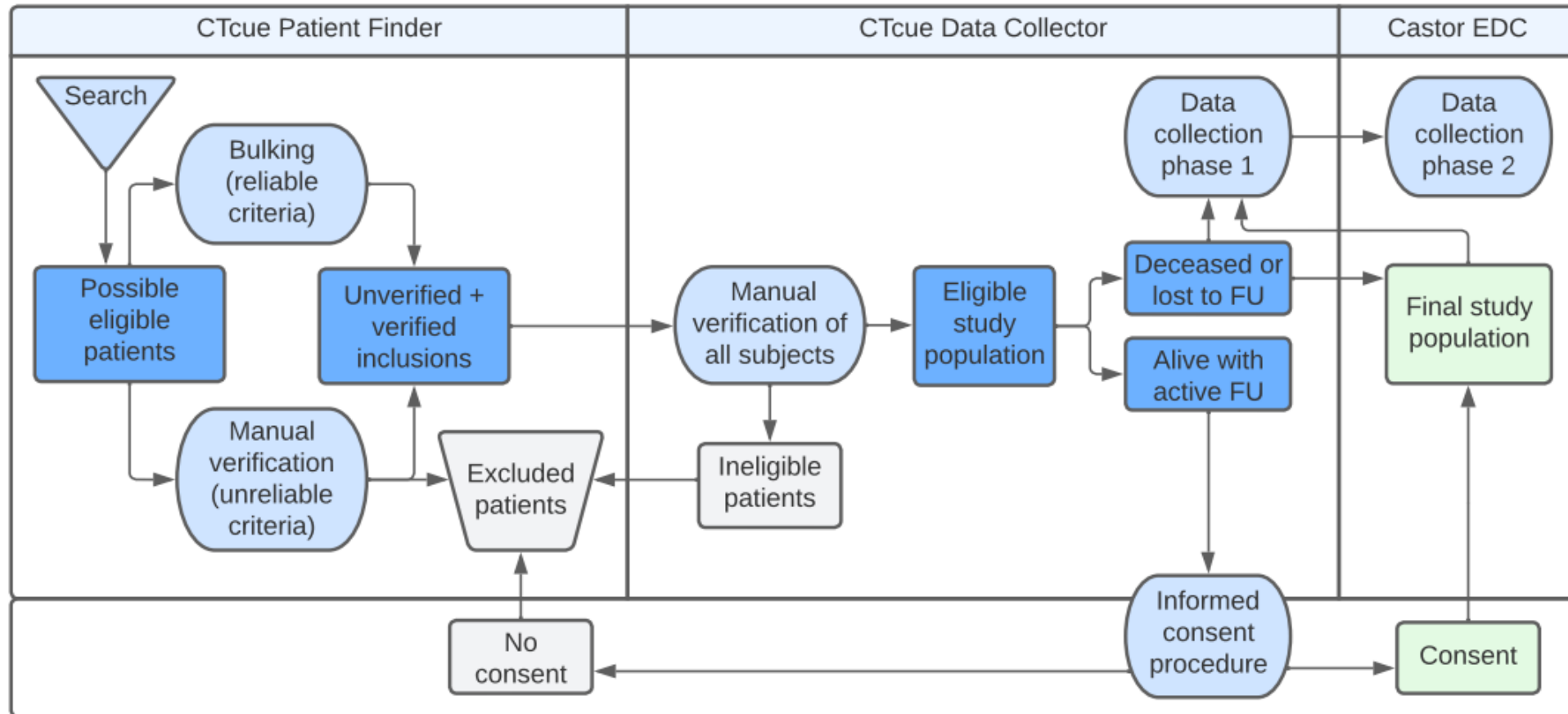
---

## Step 3: data storage

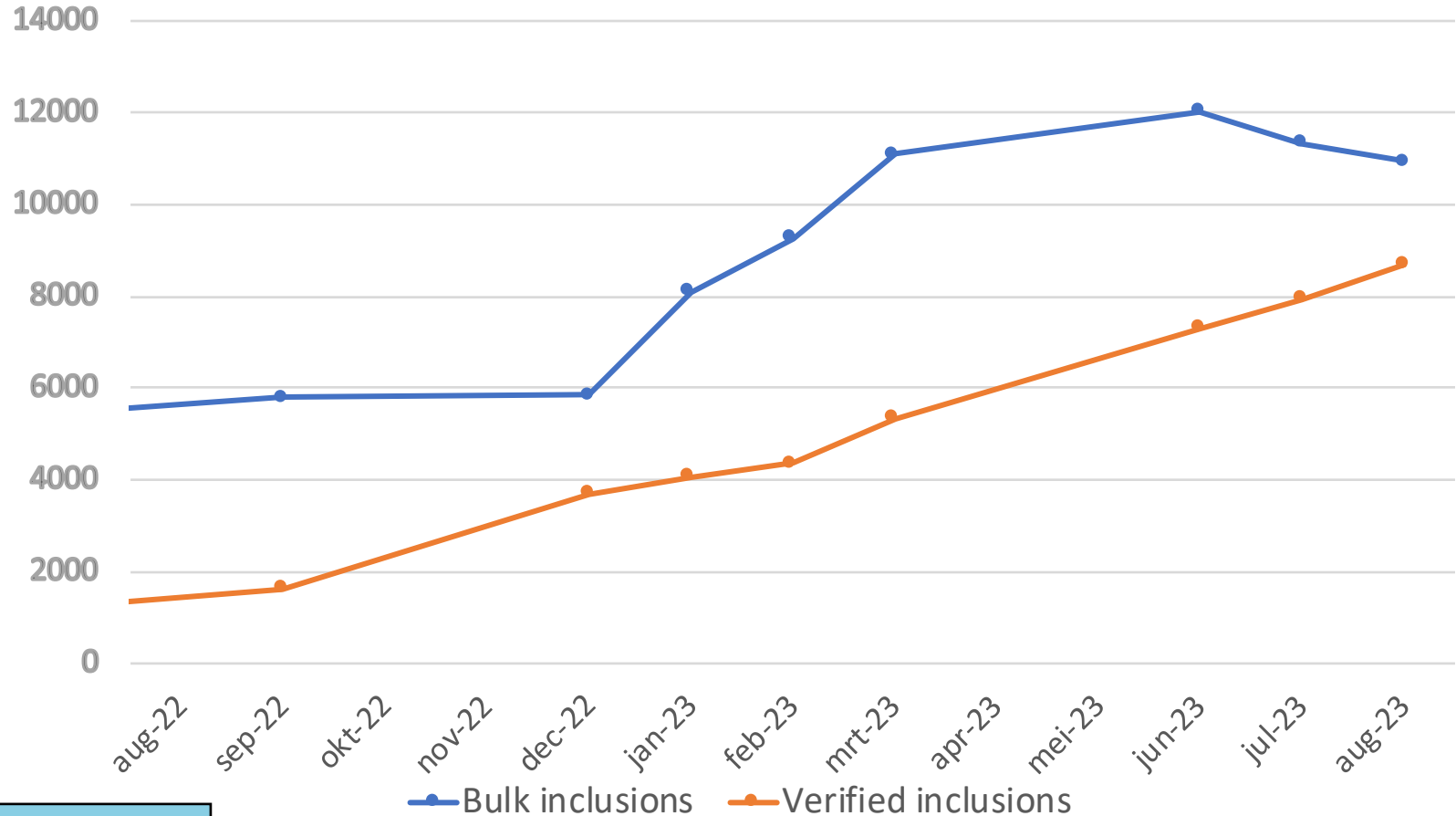
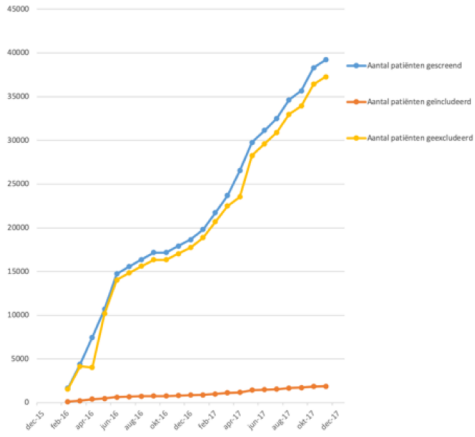
- Data are stored in CASTOR
  - Data are to be exported from CTcue tool to Excel and uploaded into CASTOR
- Quality control
  - Automated checks into the eCRF to make certain data meet specific format / maximum values
  - Periodic quality checks on manually completed data for discrepancies and missing values



# Workflow summary

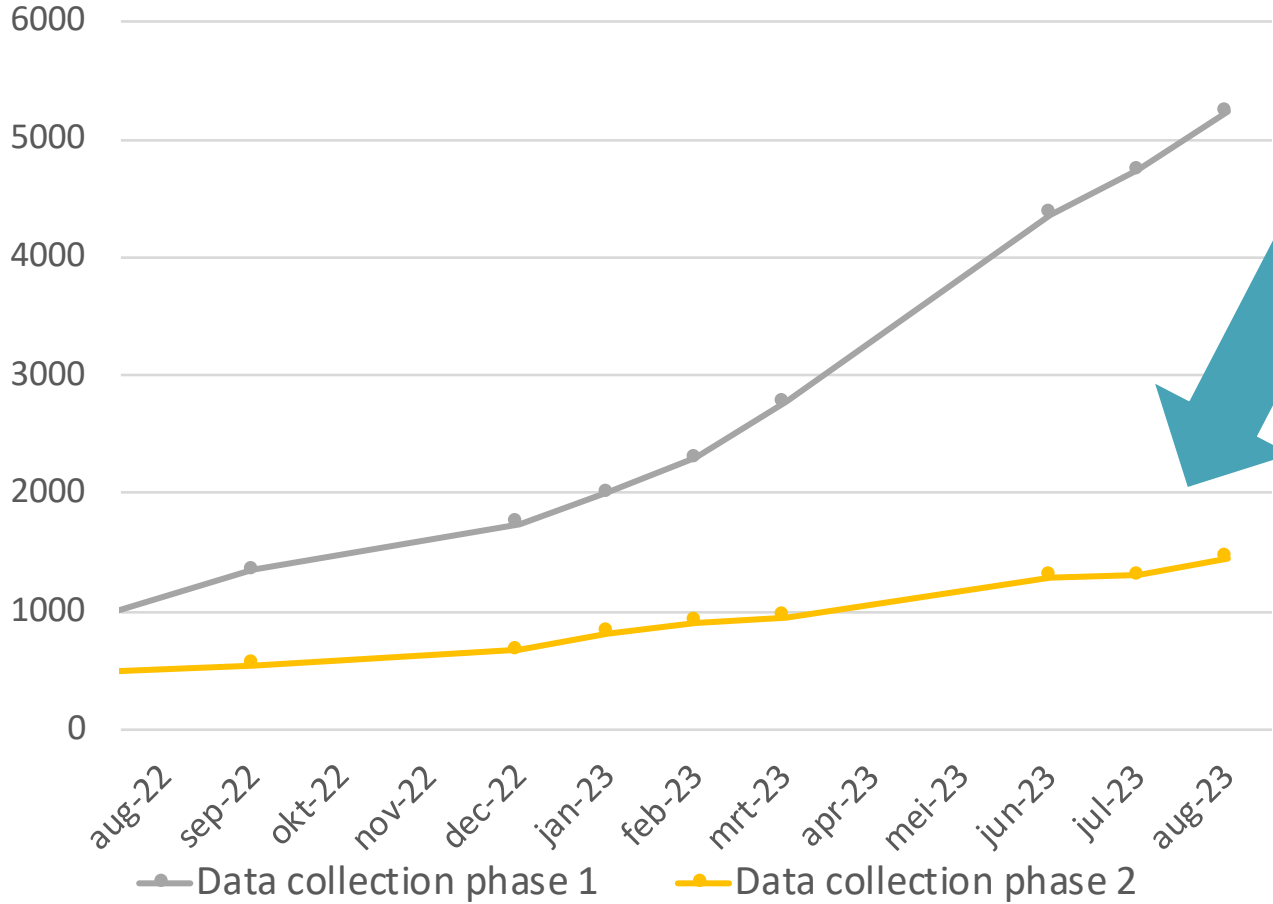
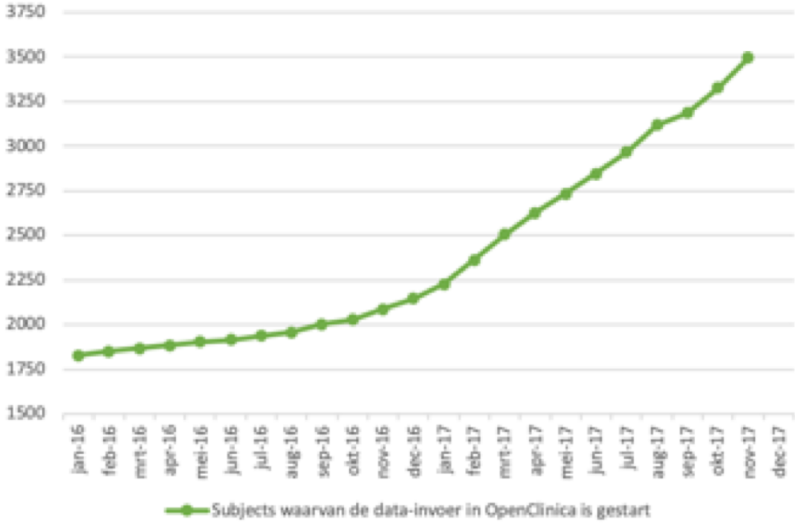


# Am I happy then?\*



\*spoiler: almost never, always room for improvement

# The major room for improvement



# Our experiences

---

- Quick method
  - Time reduction from 300 min per patient --> 105 min per patient (learning curve!)
- Easily learned by new datamanagers
- Easily adapted to other EMR systems
- Data export to CASTOR remains a concern (possible mistakes)
  - Bulk transfers are made (population in one hospital needs to be validated prior to export)
  - → time lag

Questions?  
[malou.kuppen@maastro.nl](mailto:malou.kuppen@maastro.nl)