GIN Conference 2023
Glasgow

Continuous Measurements of Clinical Practice Guideline Adherence

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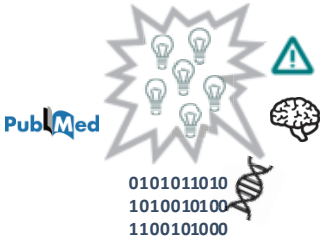
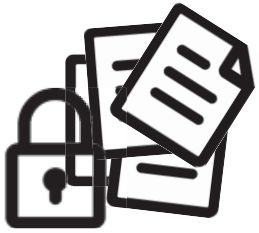
Problem statement

Patients potentially miss out on personalized care based on latest insights

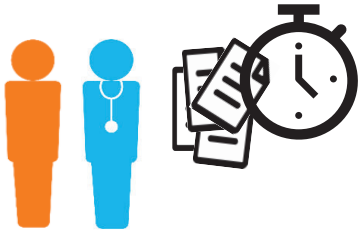
Too much knowledge to process by any individual



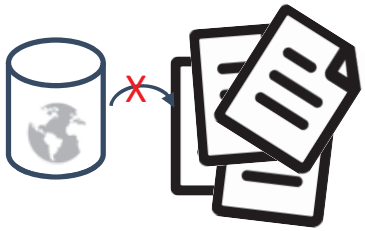
Trapped in free text



To point-of-care is an inefficient process



Unsuitable for validation and improving with Real World Data



Alertness Project

Goal

Keeping guidelines up-to-date by continuously identifying potential topics for revision

Aim

Alerts based on:

1. new scientific developments (based on modifications of the NCCN® guideline)
2. variation in clinical practice (based on Real World Data)

Results

- Methodology for continuous guideline adherence measurements
- Dashboard prototype to visualize guideline adherence
- Procedure to alert guideline developers

https://iknl.nl/en/guidelines/alertness;-structural-signaling-for-up-to-date-gui

Funding

ZonMw

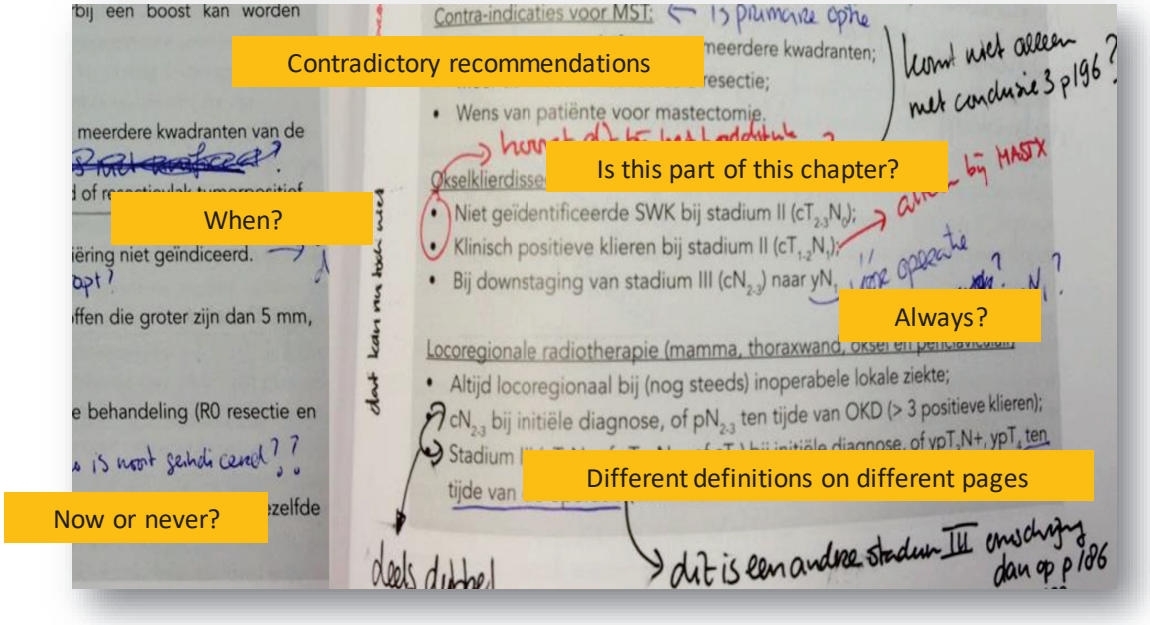
Organizations

Textual guidelines

Findings

Guideline recommendations are often intertwined in large texts distributed over different chapters and modules

Textual guidelines often are inconsistent and ambiguous



Textual guidelines vs. Clinical Decision Algorithms

Text

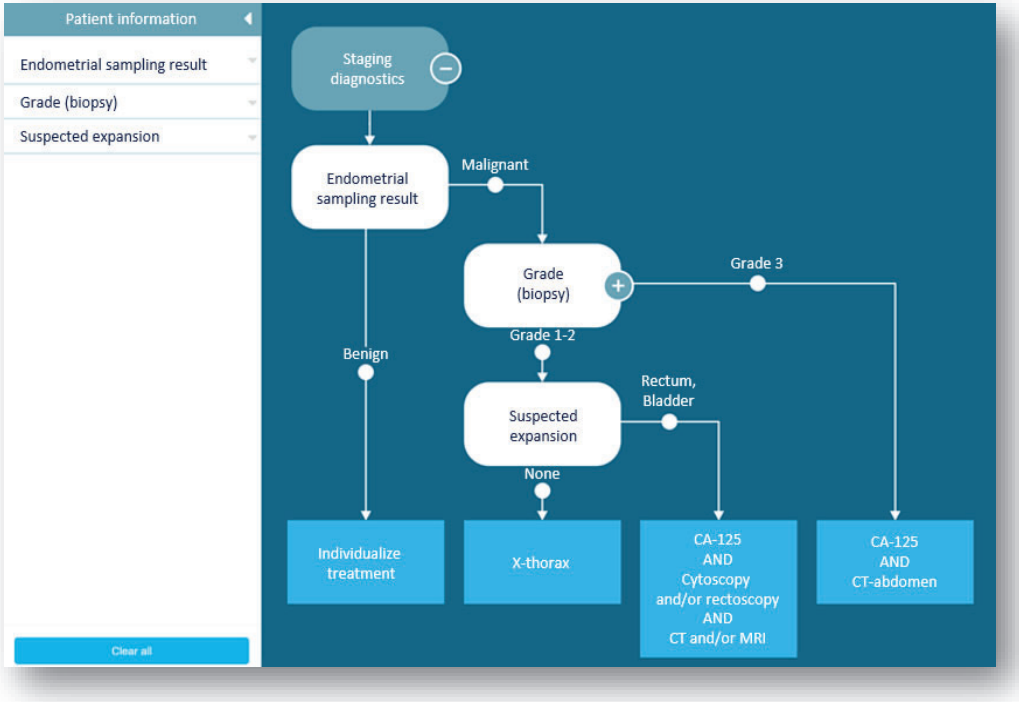
If extra-uterine disease is suspected: serum CA125

It has been shown that of the imaging techniques (MRI, CT scan, PET scan), the MRI has the best predictive value for determining myometrial invasion, especially when contrast-enhancing agents are used.

Basic imaging
- *transvaginal ultrasound (see related)*
- *chest x-ray*
- *cystoscopy/rectoscopy if complaints and/or symptoms give cause for this*

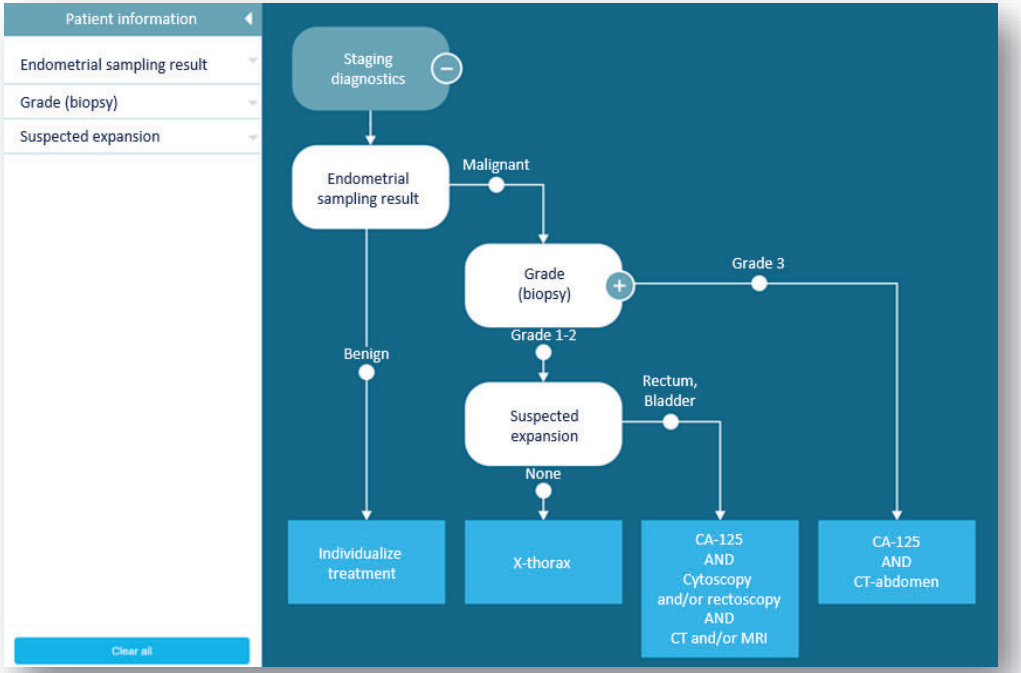
Do not routinely perform a CT scan of the abdomen in women with suspected low-stage low-grade endometrial cancer.

Clinical Decision Tree

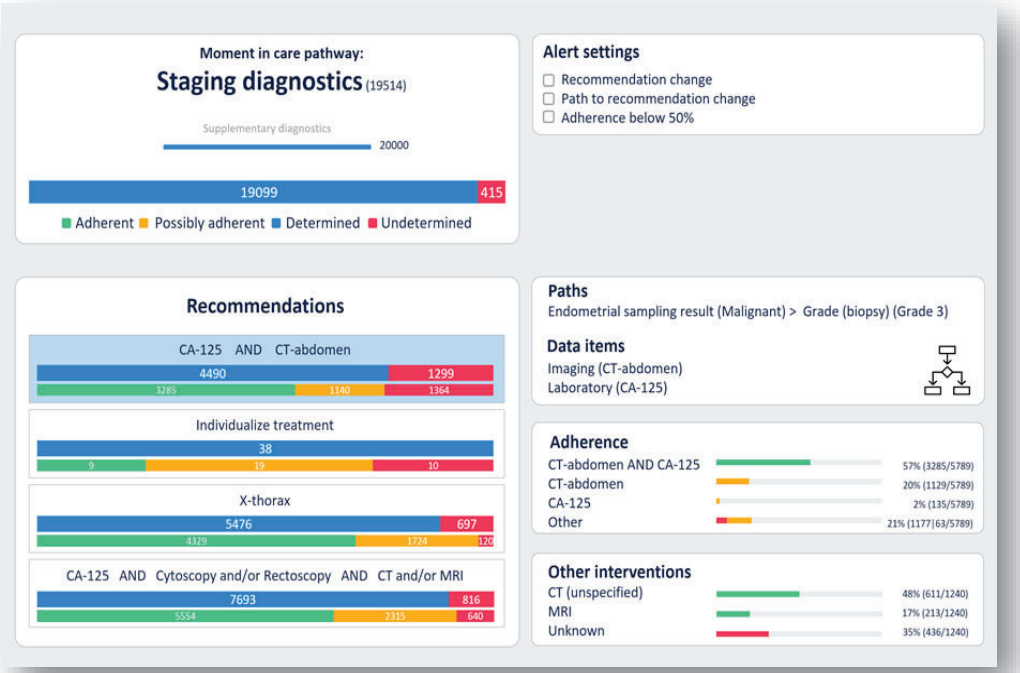


Clinical Decision Algorithms vs. Dashboard

Clinical Decision Tree



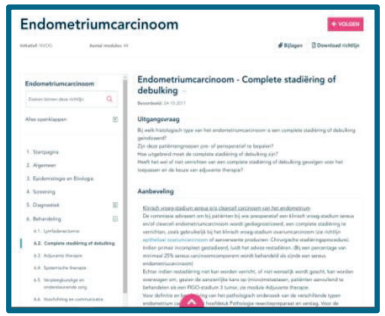
Dashboard



Visualising data and recommendations

ALERTNESS

CPG + Real World Data



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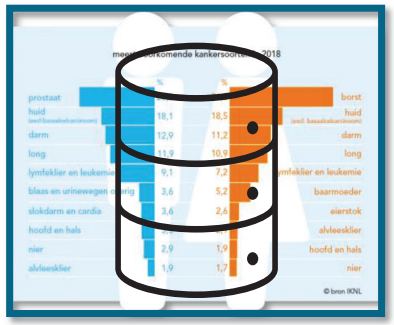
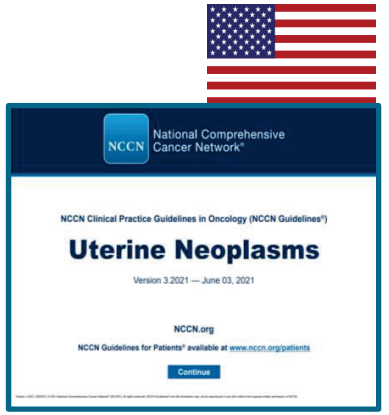


CRGO NCR

CPG versus CPG

VS



CRGO NCCN

CRGO: Committee on Guidelines for Gynecological Oncology
NCR: Netherlands Cancer Registry
NCCN: National Comprehensive Cancer Network

Methods

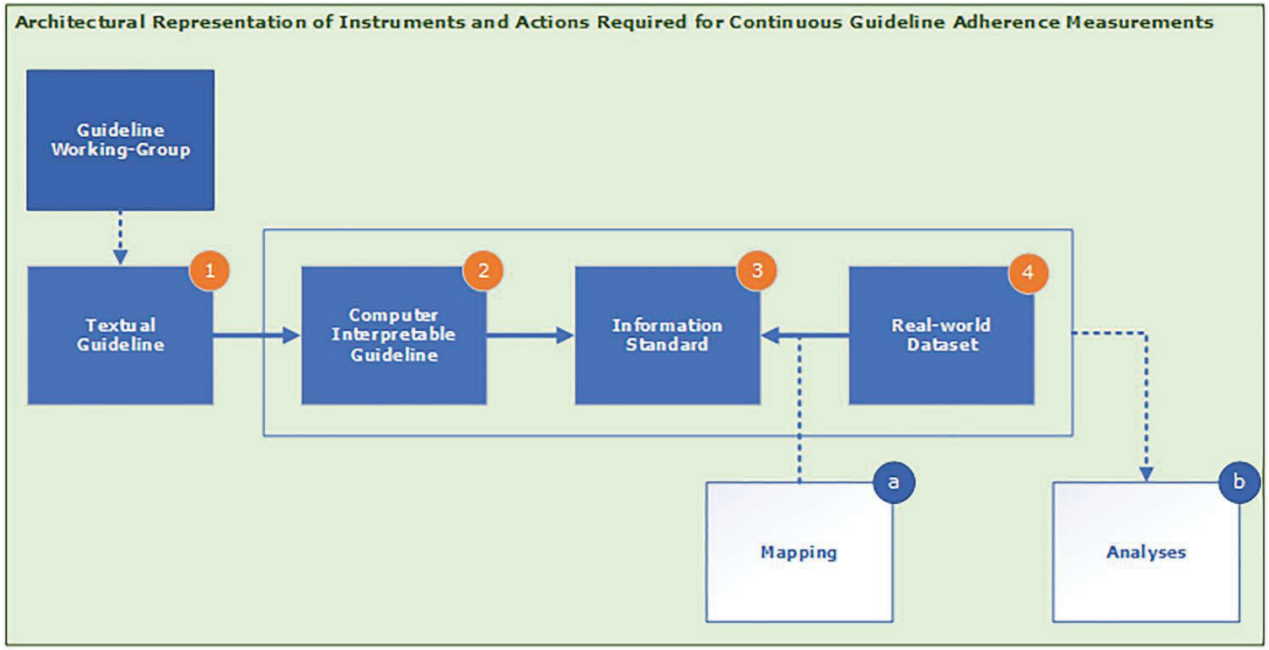
ALERTNESS

- Process analyses
- Recommendation parsing
- Adherence classification

Ebben et al; A Novel Method for Continuous Measurements of Clinical Practice Guideline Adherence, Learning Health Systems; in press

Methods

Process analyses



Recommendation parsing

Adherence classification

Ebben et al; A Novel Method for Continuous Measurements of Clinical Practice Guideline Adherence, Learning Health Systems; in press

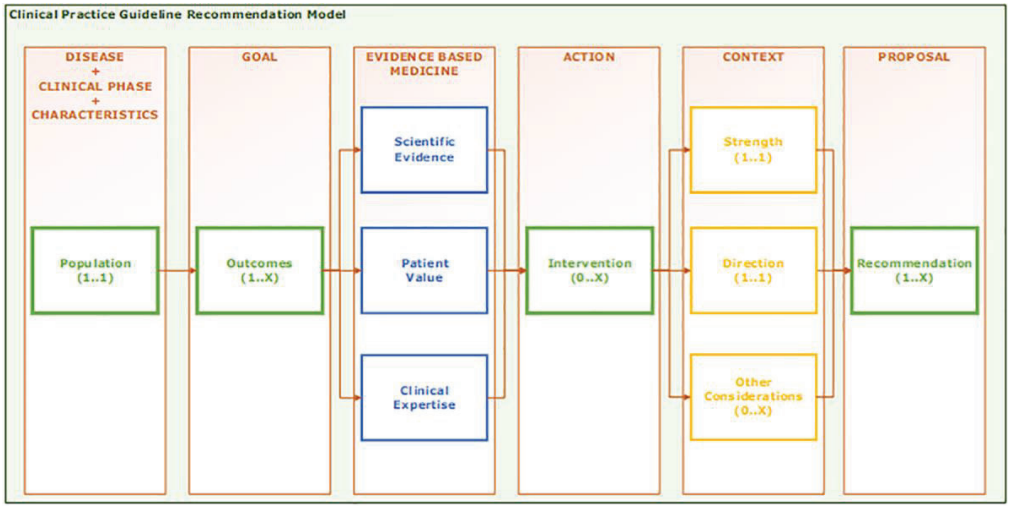
Methods

Process analyses

Recommendation parsing

$$R = \Sigma(I+D+S)\pm C$$

R = Recommendation, I = Intervention, D = Direction, S = Strength, C = 'Other considerations'



Adherence classification

Ebben et al; A Novel Method for Continuous Measurements of Clinical Practice Guideline Adherence, Learning Health Systems; in press

Methods

Process analyses

Recommendation parsing

Adherence classification

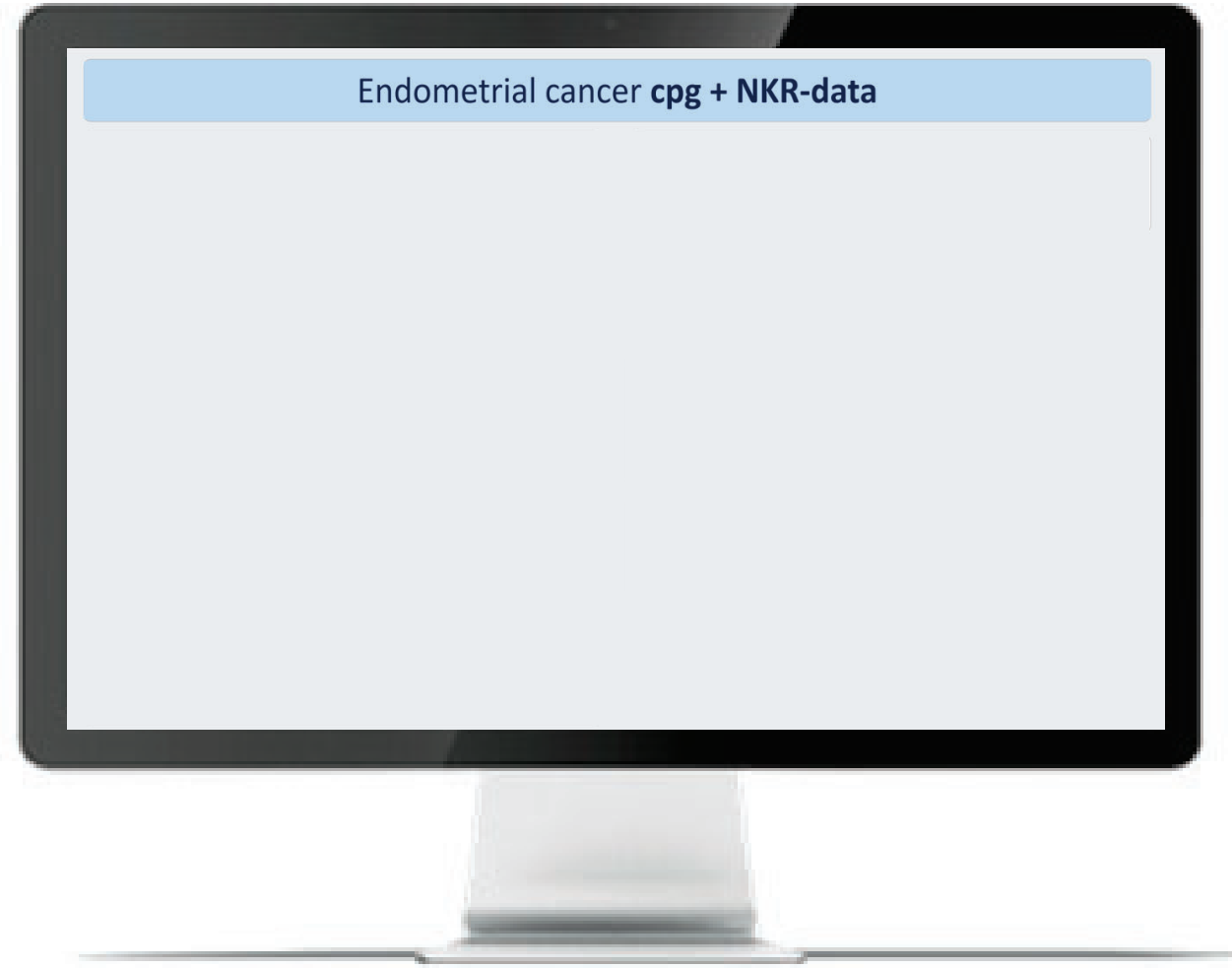
Guideline recommendation	Dataset intervention(s)	Adherence classification
Strong, singular intervention recommendations		
Hysterectomy	Hysterectomy (only)	Adherent
	Bilateral salpingo-oophorectomy (only)	Non-adherent
	Hysterectomy AND Lymph node dissection	Other*
	'Other'	Non-adherent
	'No Intervention'	Non-adherent
Hysterectomy OR Bilateral salpingo-oophorectomy	Hysterectomy (only)	Adherent
	Hysterectomy AND Lymph node dissection	Other*

Ebben et al; A Novel Method for Continuous Measurements of Clinical Practice Guideline Adherence, Learning Health Systems; in press

Visualising data and recommendations

ALERTNESS

CPG + Real World Data

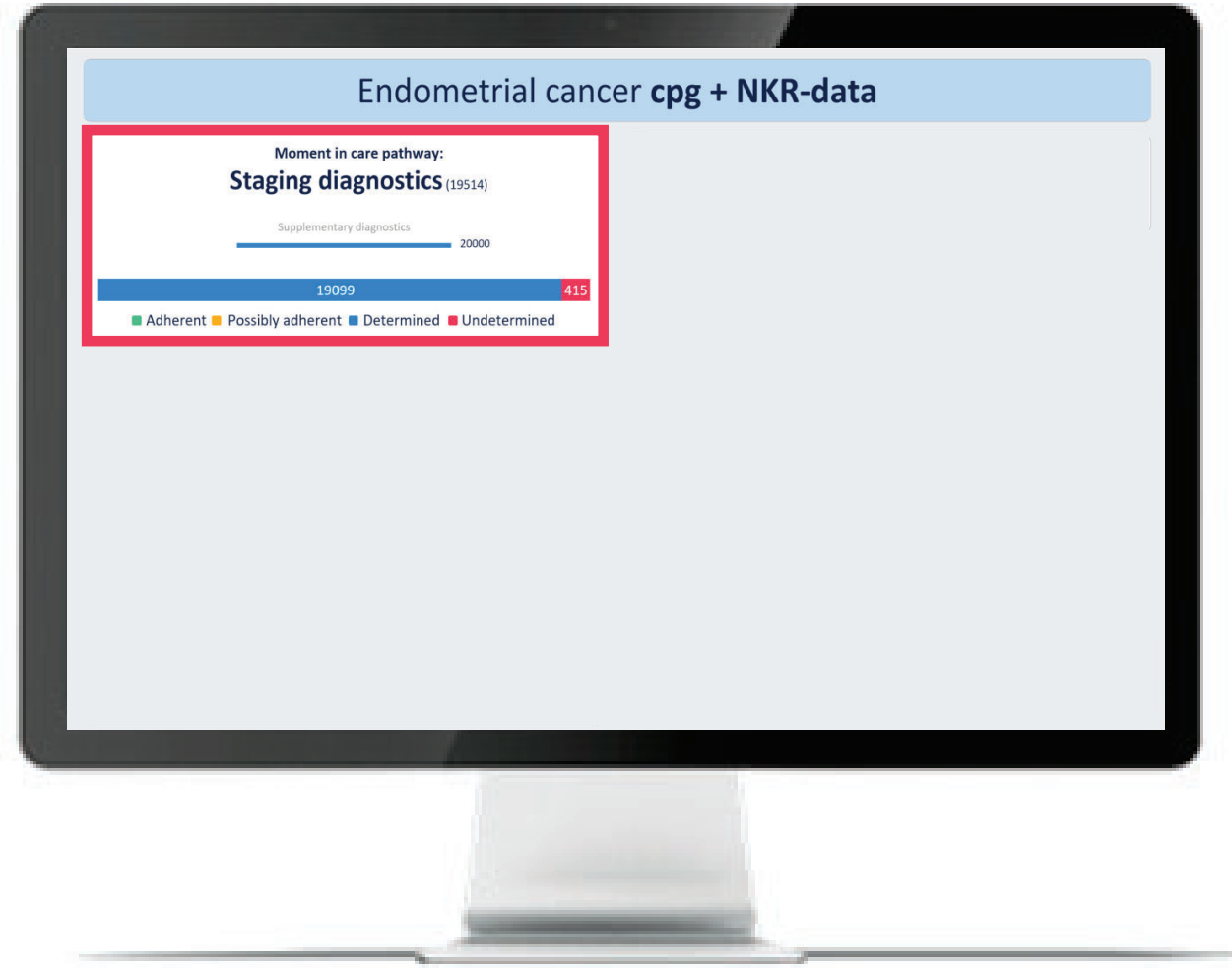


Visualising data and recommendations

ALERTNESS

CPG + Real World Data

- Select a decision tree of interest
- See precursor trees
- Visualize number of determined patients

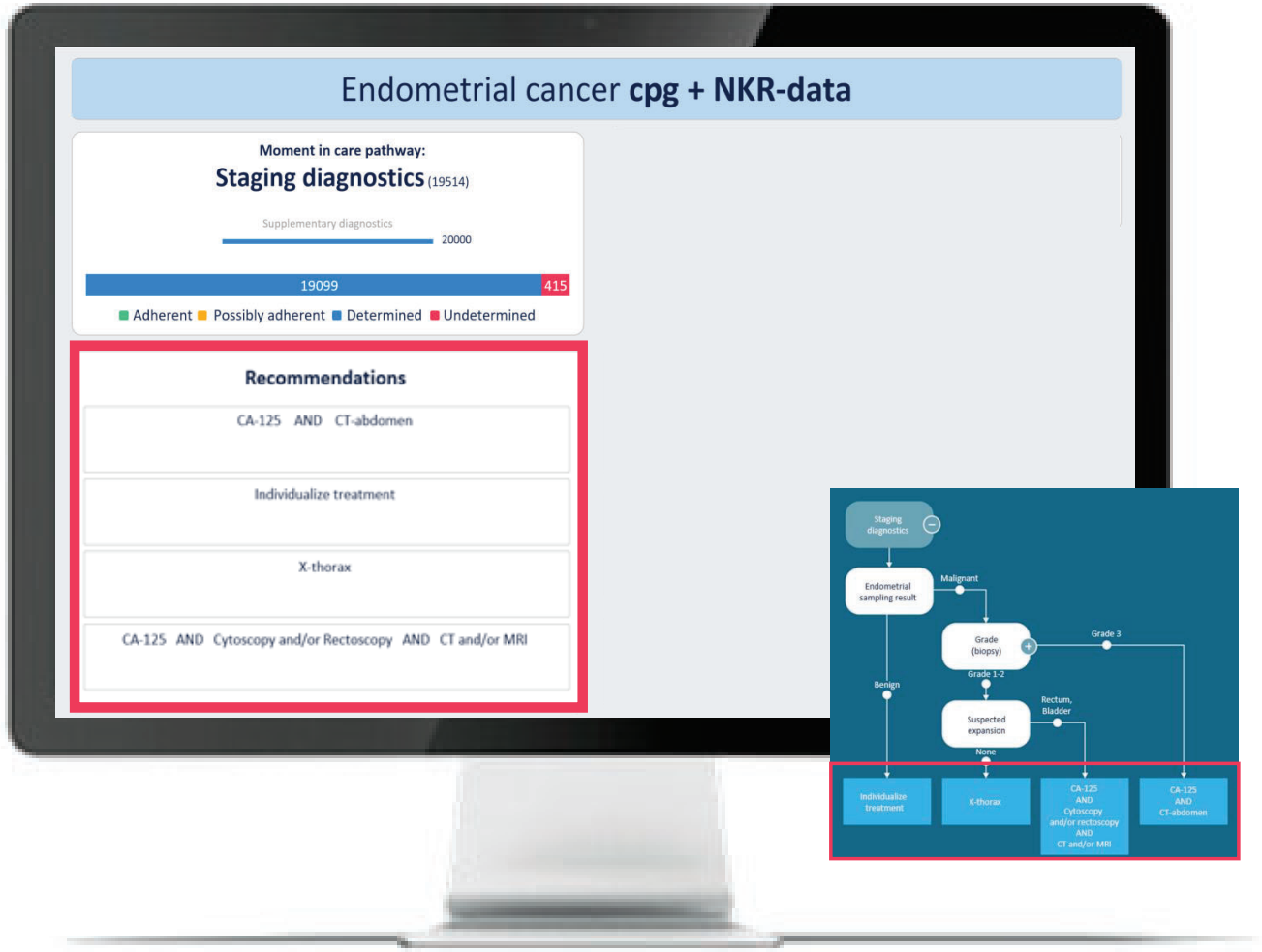


Visualising data and recommendations

CPG + Real World Data

Guideline recommendations for a specific moment in the carepathway

What happened to my patients?

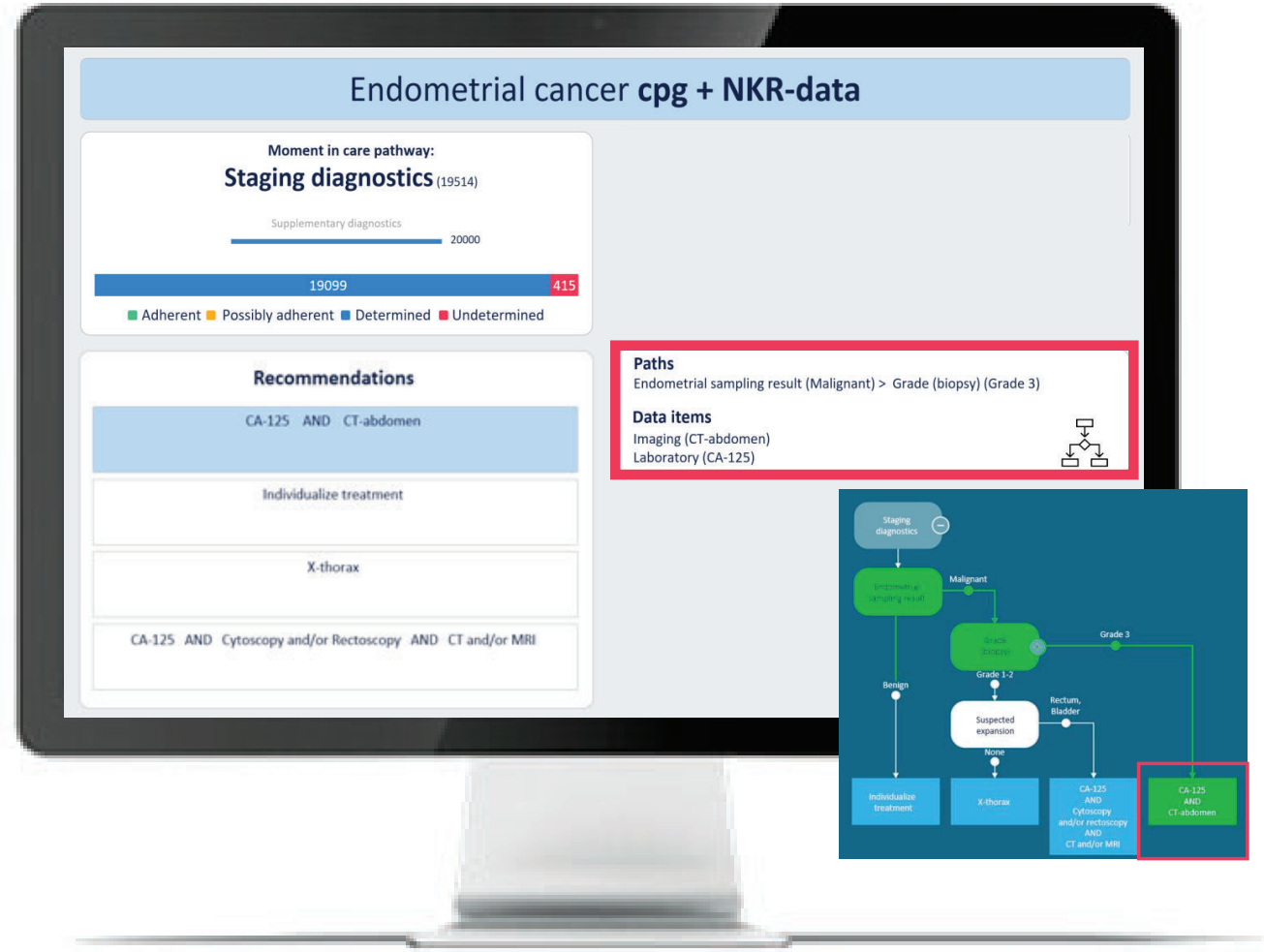


Visualising data and recommendations

ALERTNESS

CPG + Real World Data

Paths leading to an individual recommendation show subpopulations



What happened to my patients?

Visualising data and recommendations

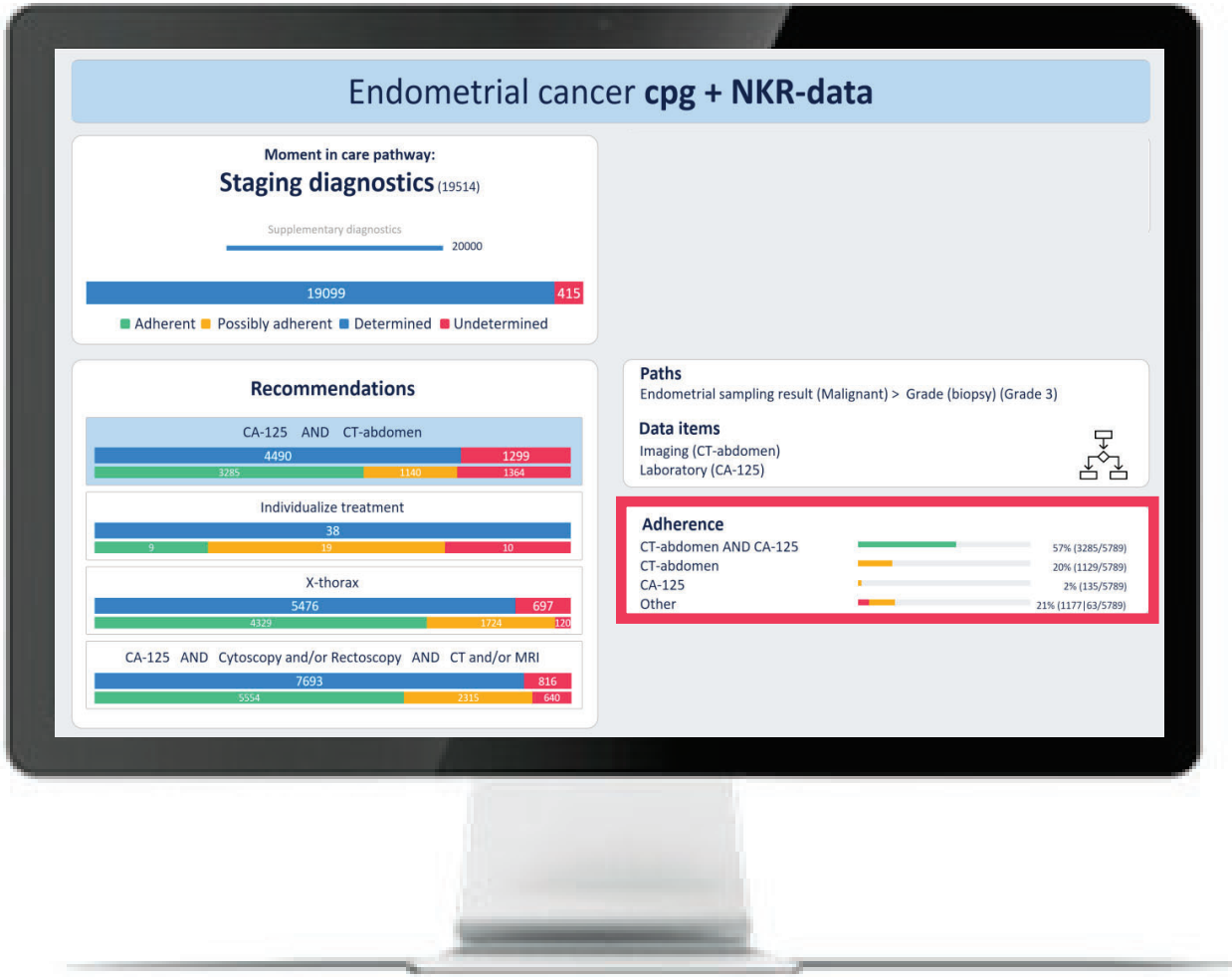
ALERTNESS

CPG + Real World Data

Insights in which interventions actually happened in those populations

When do we not follow the guideline?

What happened to my patients?



Visualising data and recommendations

ALERTNESS

CPG + Real World Data

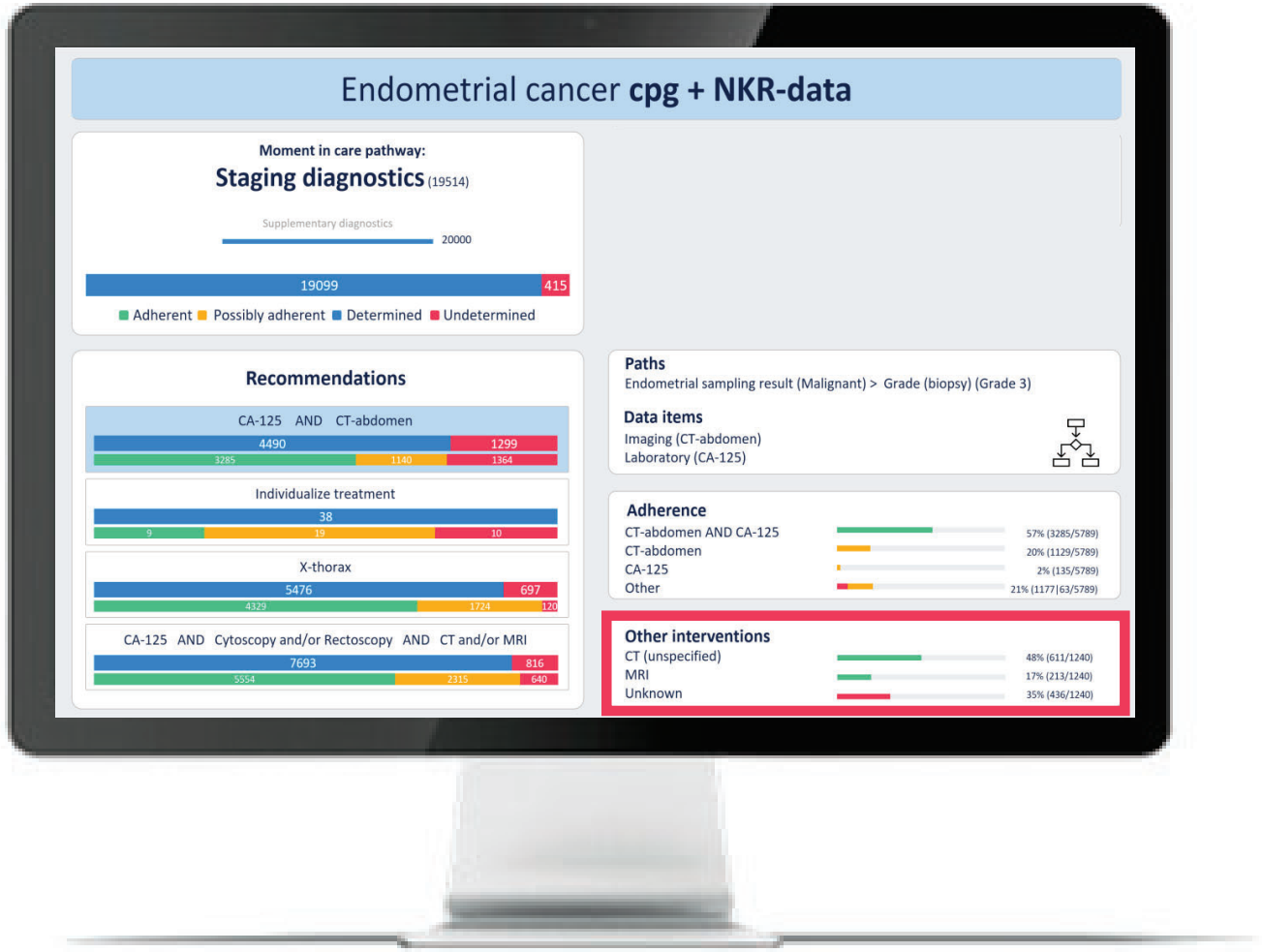
When not adherent to the guideline:
which intervention was given instead?

When do we not follow the guideline?

Why is adherence this low?

Is that bad?

What happened to my patients?

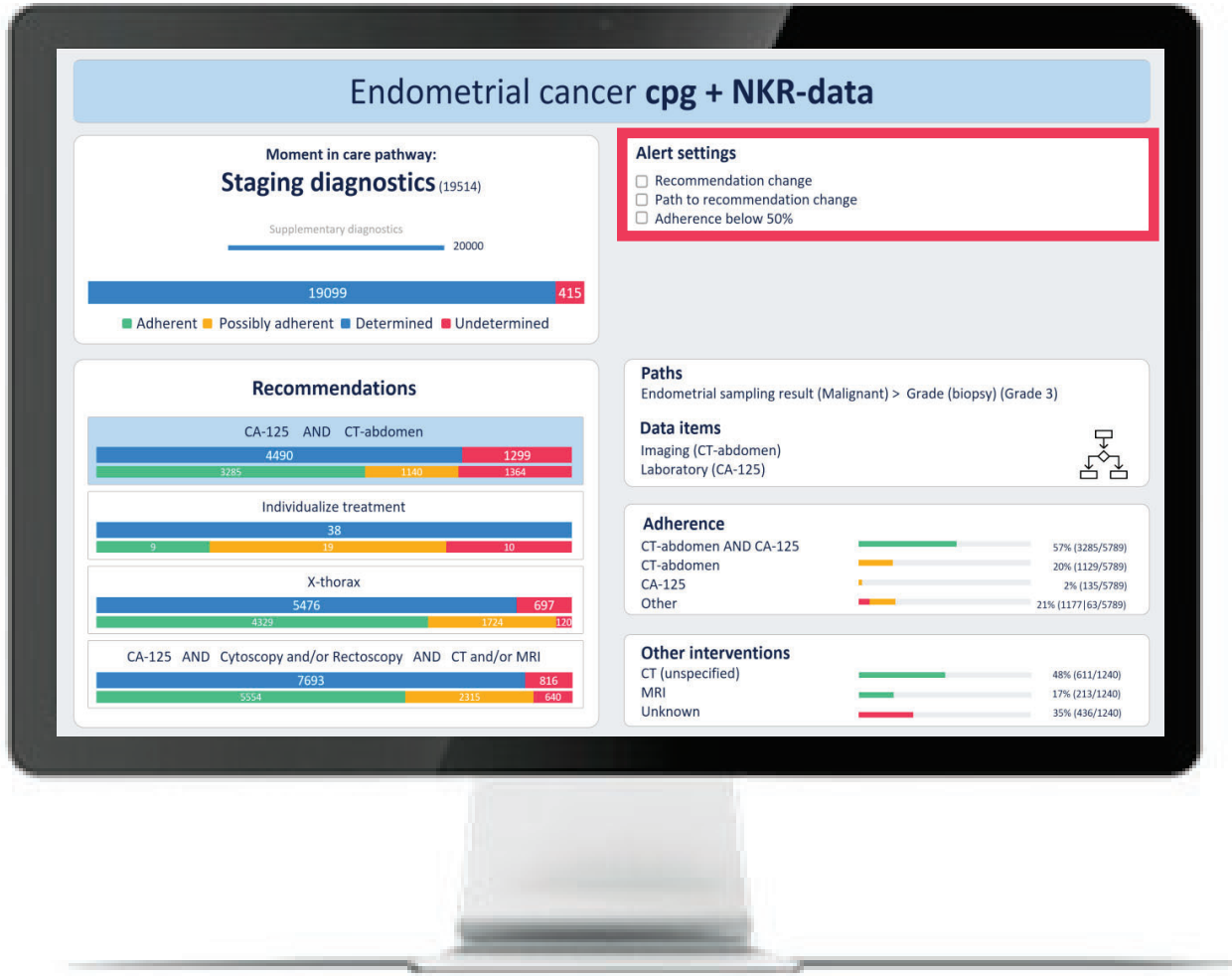


Visualising data and recommendations

ALERTNESS

Alert settings

When do we need to revise a module?



Mapping results

ALERTNESS

- Clinical Decision Trees
- Netherlands Cancer Registry (NCR)
- Populated Clinical Decision Trees

Mapping results

Clinical Decision Trees

Remodeling the Dutch guideline for endometrial cancer resulted in:

- 10 clinical decision trees
  - 22 unique patient and disease characteristics
  - 46 unique interventions

Netherlands Cancer Registry (NCR)

Populated Clinical Decision Trees

Mapping results

Clinical Decision Trees

Netherlands Cancer Registry (NCR)

Netherlands Cancer Registry endometrial cancer dataset

- 124 unique data-items
  - 22 data-items directly mappable
  - 10 data-items mappable after editing
  - 92 additional data-items (enabling potential filtering options)

Netherlands Cancer Registry endometrial cancer data

(Incidence years: 2010-2022; endometrioid, sereus, clearcell carcinoma, >=18 years)

- Inclusions: 21,602

Populated Clinical Decision Trees

Mapping results

Clinical Decision Trees

Netherlands Cancer Registry (NCR)

Populated Clinical Decision Trees

A total of **4 clinical decision trees** successfully populated with NCR data:

- Primary treatment
- Adjuvant treatment for endometrioid type
- Adjuvant treatment for sereus and clearcell type
- Staging evaluation

Analysis results

ALERTNESS

- Adherence per subpopulation
- Adherence trends over time
- Recommendation implementation pace
- Non-adherent treatment strategies
- Identification of non-guideline characteristics that influence adherence

Results [example]

Adherence per subpopulation

Population: Primary treatment, Endometrioid, FIGO stage I:
→Recommendation = Total abdominal hysterectomy AND BSO, OR Total laparoscopic hysterectomy AND BSO
→***Adherence: 82%***

Population: Adjuvant treatment, endometrioid, stage IA, Grade 1/2:
→Recommendation = No Adjuvant Treatment
→ ***Adherence: 98%***

Adherence trends over time

Recommendation implementation pace

Non-adherent treatment strategies

Identification of non-guideline characteristics that influence adherence

Results [example]

ALERTNESS

Adherence per subpopulation

Adherence trends over time

Population: Primary treatment, Endometrioid, FIGO stage I:
→Recommendation = Total abdominal hysterectomy AND BSO, OR Total laparoscopic hysterectomy AND BSO

Year	Cases	Adherent	Non-adherent	Other
2017	1019	841 (83)	97 (10)	81 (8)
2018	984	822 (84)	109 (9)	53 (5)
2019	1106	911 (82)	130 (12)	65 (6)
2020	1176	957 (81)	150 (13)	69 (6)
2021	1168	956 (82)	159 (14)	53 (5)

Recommendation implementation pace

Non-adherent treatment strategies

Identification of non-guideline characteristics that influence adherence

Results [example]

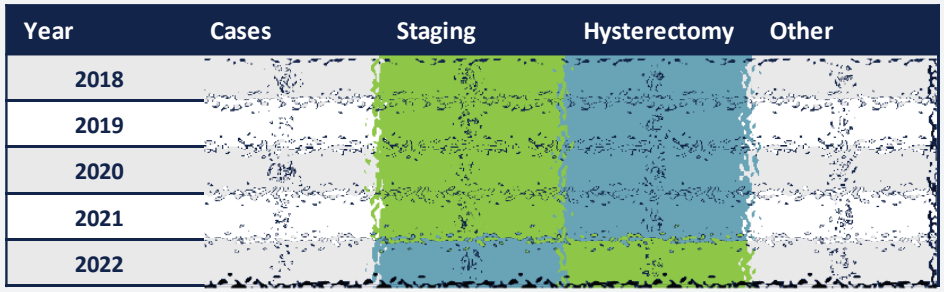
ALERTNESS

Adherence per subpopulation

Adherence trends over time

Recommendation implementation pace

Population: Primary treatment, Sereus/Clearcell carcinoma, FIGO stage II:
→Recommendation:
- <=2021: Staging
- >2022: Hysterectomy



Non-adherent treatment strategies

Identification of non-guideline characteristics that influence adherence

Results [example]

ALERTNESS

Adherence per subpopulation

Adherence trends over time

Recommendation implementation pace

Non-adherent treatment strategies

Population: Primary treatment, Sereus/Clearcell carcinoma, FIGO stage I:

Intervention	Frequency
No surgery	48
TAH AND BSO	88
TLH AND BSO	198
UE incl BSO	<10
TAH (only)	14

Intervention (cont)	Frequency
TLH (only)	13
UE wo BSO	12
Radical UE	<10
Debulking	10
Staging surgery*	**601**

Identification of non-guideline characteristics that influence adherence

Results [example]

ALERTNESS

- Adherence per subpopulation
- Adherence trends over time
- Recommendation implementation pace
- Non-adherent treatment strategies
- Identification of non-guideline characteristics that influence adherence

Population: Primary treatment, Endometrioid, FIGO stage I:
→Recommendation = Total abdominal hysterectomy AND BSO, OR Total laparoscopic hysterectomy AND BSO

Age	Cases	Adherent	Non-adherent	Other
<=59	1667	1381 (83)	161 (10)	125 (7)
60-69	2377	2063 (87)	178 (7)	136 (6)
70-79	2229	1873 (84)	215 (10)	141 (6)
>=80	974	638 (66)	253 (26)	83 (9)
Total	**7247**	**5955**	**807**	**485**

Take home messages

Visualising data and recommendations

- Too much knowledge to process by any individual is trapped in free text
- Translation of text to CDTs using information standards enables reusing data
- Combining CDTs and Real-World Data supports a learning health system
- Visualizing (combined) data sources supports doctors, guideline developers and patients
- This methodology is scalable to other diseases and settings

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Visualising data and recommendations

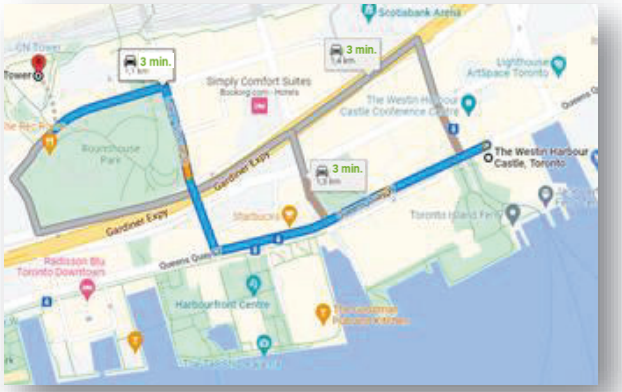
ALERTNESS

CDTs based on CPGs

Recommendations

CA-125 AND CT-abdomen
Individualize treatment
X-thorax
CA-125 AND Cytoscopy and/or Rectoscopy AND CT and/or MRI

Interactice use



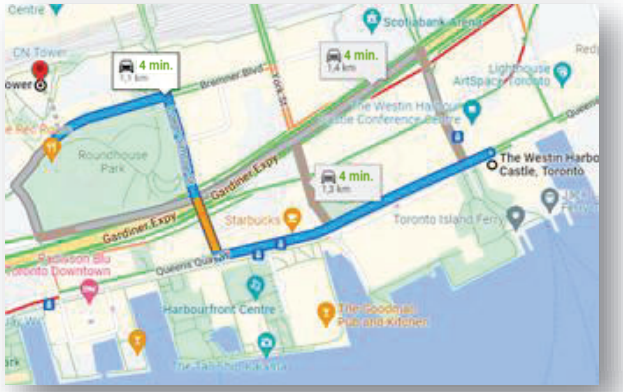
Recommendations

CA-125 AND CT-abdomen
Individualize treatment

Paths
Endometrial sampling result (Malignant) > Grade (biopsy) (Grade 3)

Data items
Imaging (CT-abdomen)
Laboratory (CA-125)

Enriched with RWD



Recommendations

CA-125 AND CT-abdomen

4490 | 1299
3285 | 1140 | 1364

Individualize treatment

Adherence

CT-abdomen AND CA-125	57% (3285/5789)
CT-abdomen	20% (1129/5789)
CA-125	2% (135/5789)
Other	21% (1177|63/5789)