Analyses and Management of Healthcare Data for Cancer Care

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Front-End

Visualisation
Reporting Service
Dashboard

Back-End

Migration

API Gateway

Toxicity Predictor
(1,2,3,4,....)
ML, NLP, DL

PoC

Issues...
Issues...

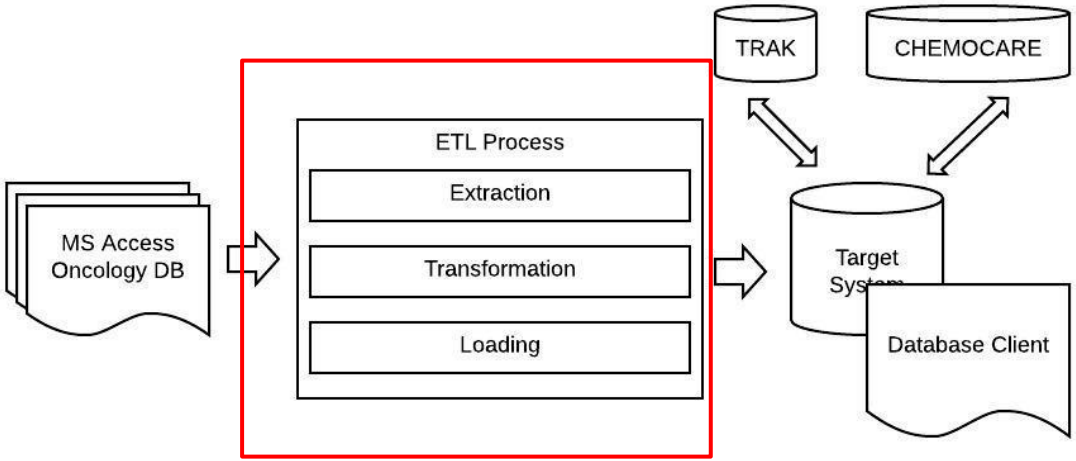
Synthetic Data

IBM

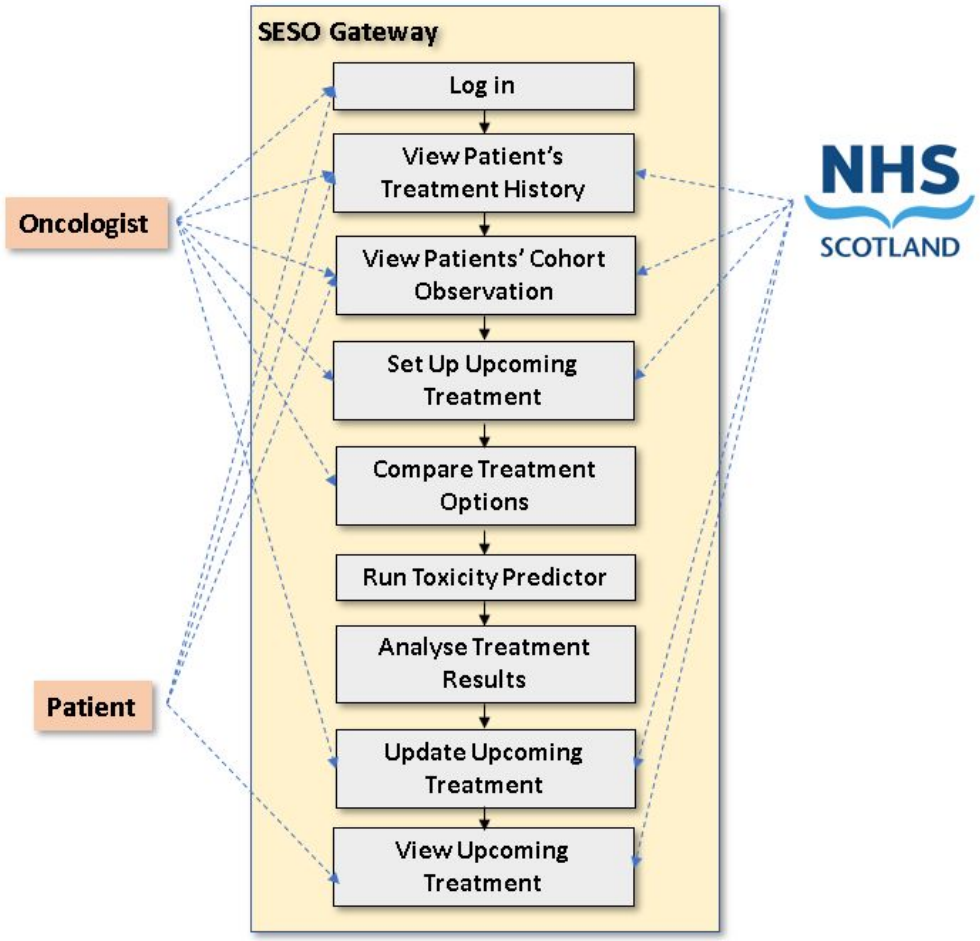
Cancer Waiting Time

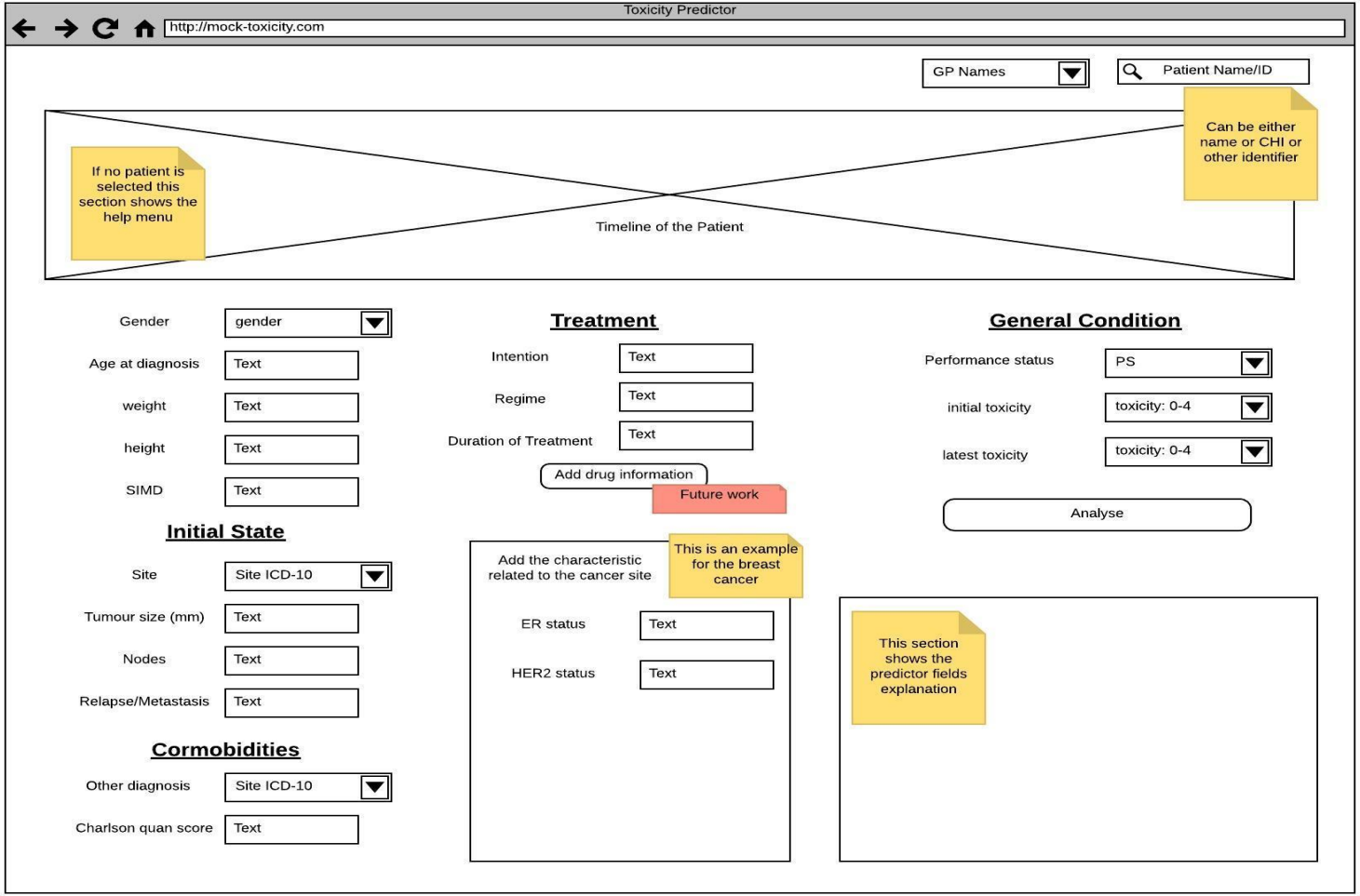
Oncology Migration

- Migrated the DB from **Microsoft Access Oncology DB** to **SQL Server**
- We have performed the latest UAT migration.
- We are going to migrate the database to the production server early December.



Toxicity Predictor

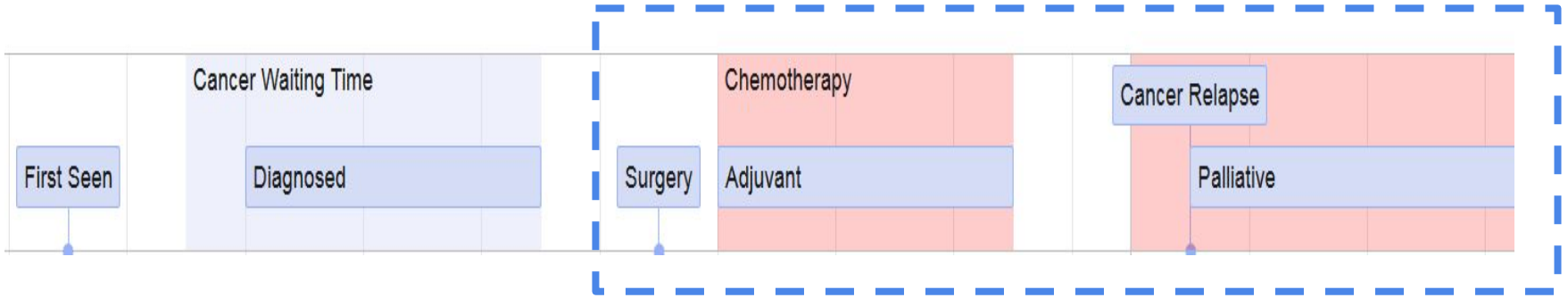



Toxicity Predictor
http://mock-toxicity.com
GP Names
Patient Name/ID
Can be either name or CHI or other identifier
If no patient is selected this section shows the help menu
Timeline of the Patient
Gender
gender
Age at diagnosis
Text
weight
Text
height
Text
SIMD
Text
Initial State
Site
Site ICD-10
Tumour size (mm)
Text
Nodes
Text
Relapse/Metastasis
Text
Cormobidities
Other diagnosis
Site ICD-10
Charlson quan score
Text
Treatment
Intention
Text
Regime
Text
Duration of Treatment
Text
Add drug information
Future work
Add the characteristic related to the cancer site
This is an example for the breast cancer
ER status
Text
HER2 status
Text
General Condition
Performance status
PS
initial toxicity
toxicity: 0-4
latest toxicity
toxicity: 0-4
Analyse
This section shows the predictor fields explanation

Synthetic Data

- We use IBM Constraint Solver to generate the synthetic data. For this, we determine the set of rules for each columns (i.e., data characteristic and data relation).

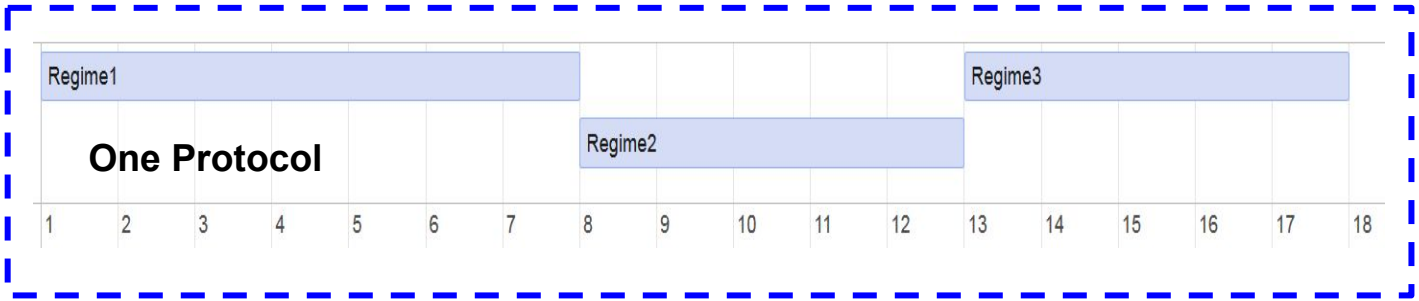
Patients' Treatment Pathway



- A patient can only be treated with one intention at a time (e.g., adjuvant)
- However, after a certain time has passed, the patient might be treated with other treatments with different intentions (e.g., Palliative, Curative)

Treatment Regimes

- Each intention has different regimes.
- Each regime has several different drugs.
- The treatment may last for several weeks or months
- A patient may be treated with several regimes at time.
- Each regime has one or more treatment cycles.
- Several different regimes may belong to one protocol.



How does the table represent the regimes?

CHI	Intention	Regime	drug names	cycle
patient 1	Adjuvant	Regime1	drug1	1
patient1	Adjuvant	Regime1	drug2	1
patient 1	Adjuvant	Regime1	drug1	2
patient 1	Adjuvant	Regime1	drug2	2
patient 1	Adjuvant	Regime1	drug1	3
patient 1	Adjuvant	Regime1	drug2	3

- Incidence date happened from 250 days to 5 years before the current date

```
currentDate - (5*365) < incidence_date <= currentDate - 250
```

- Unique CHI

```
allDiff(from(general), chi)
```

- Each patient may have more than one admissions

```
numOf(from(smr01),smr01s.chi = general.chi) =
randomWeightedNumber(
  75 ? 1,
  25 ? randomNumber(2,8)
)
```

last_toxicity_date	tumour_group	age_at_diagnosis	height	weight	surface_area	patient_type	consultant_code	intention	regime_code
2019-09-20	Other	30	1.95	63.2	1.84	D	MM	Palliative	GEM/FR-CIS NEO
2019-09-19	Breast	35.2	1.78	72.7	1.89	D	MM	Adjuvant	CAPOX LOW DOSE
2019-09-17	Lung and Chest	46.8	1.57	70.4	1.75	D	MM	Adjuvant	CISPLAT/ETOP LD
2019-09-24	Breast	88.8	1.85	69.2	1.88	D	AA	Palliative	CAPECITABINE
2019-09-16	Lung and Chest	26	1.4	57.4	1.49	D	XR	Curative	EP TESTICULAR
2019-09-07	Other	20.4	1.43	81.2	1.79	I	KU	Neo-Adjuvant	CARBO/PAC 3W EC/
2019-09-17	Breast	64.2	1.66	78.9	1.9	O	IR	Palliative	CISPLATIN&GEM
2019-09-23	Other	30.2	1.4	61.8	1.54	D	MM	Palliative	CIS/GEM BILIARY
2019-09-19	Other	33.6	1.04	79.6	1.51	D	CI	Palliative	RALOX 28DAYS
2019-09-14	Breast	24.5	1.91	83	2.09	D	HL	Adjuvant	CARBO/PAC 3W EC/
2019-09-19	Lung and Chest	31.9	1.73	71.4	1.85	D	WR	Palliative	PAZOPANIB RCC
2019-09-21	GI Lower	22.4	1.03	72.3	1.43	I	NO	Curative	CAPECITABINE XRT
2019-09-12	Other	29.1	1.76	63.8	1.76	D	AB	Palliative	ERIBULIN
2019-09-14	Breast	58.3	1.58	68.2	1.72	D	VI	Adjuvant	BILCAP TRIAL
2019-09-19	Other	78.2	1.71	80.5	1.95	D	AB	Palliative	AFLIB IRMDG IP

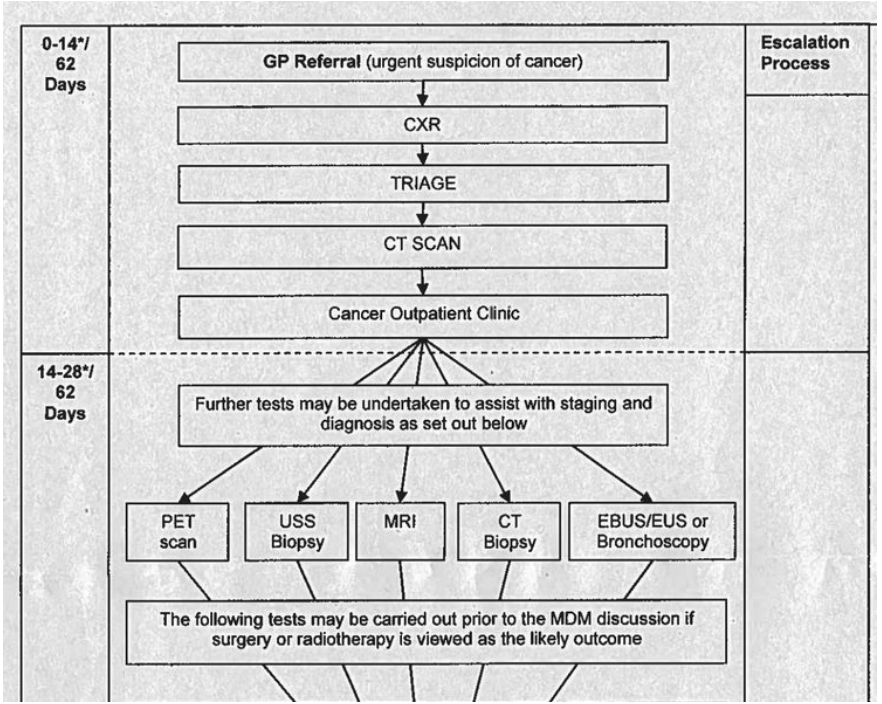
Cancer Waiting Time

- Created the first version query to flag and observe the cancer waiting time.

	SOURCE	START_WAITING_DATE	END_WAITING_DATE	WAITING_TIME	E_START_DATE	E_END_DATE	PREV_ADMISSION_END_DATE	EVENT_WAITING_TIME	ADM
1	IP	14-MAR-16	03-JUN-16	81	21-MAR-16	23-MAR-16	(null)	(null)	
2	OP	14-MAR-16	03-JUN-16	81	29-MAR-16	29-MAR-16	23-MAR-16	6	
3	OP	14-MAR-16	03-JUN-16	81	07-APR-16	07-APR-16	29-MAR-16	9	
4	IP	14-MAR-16	03-JUN-16	81	13-APR-16	16-APR-16	07-APR-16	7	
5	OP	14-MAR-16	03-JUN-16	81	28-APR-16	28-APR-16	16-APR-16	12	
6	OP	14-MAR-16	03-JUN-16	81	17-MAY-16	17-MAY-16	28-APR-16	19	
7	OP	14-MAR-16	03-JUN-16	81	23-MAY-16	23-MAY-16	17-MAY-16	6	
8	OP	14-MAR-16	03-JUN-16	81	14-MAR-16	27-MAY-16	23-MAY-16	-69	
9	OP	14-MAR-16	03-JUN-16	81	31-MAY-16	31-MAY-16	27-MAY-16	5	
10	OP	14-MAR-16	03-JUN-16	81	03-JUN-16	03-JUN-16	31-MAY-16	3	
11	OP	15-JUN-18	15-JUN-18	0	15-JUN-18	15-JUN-18	03-JUN-16	743	

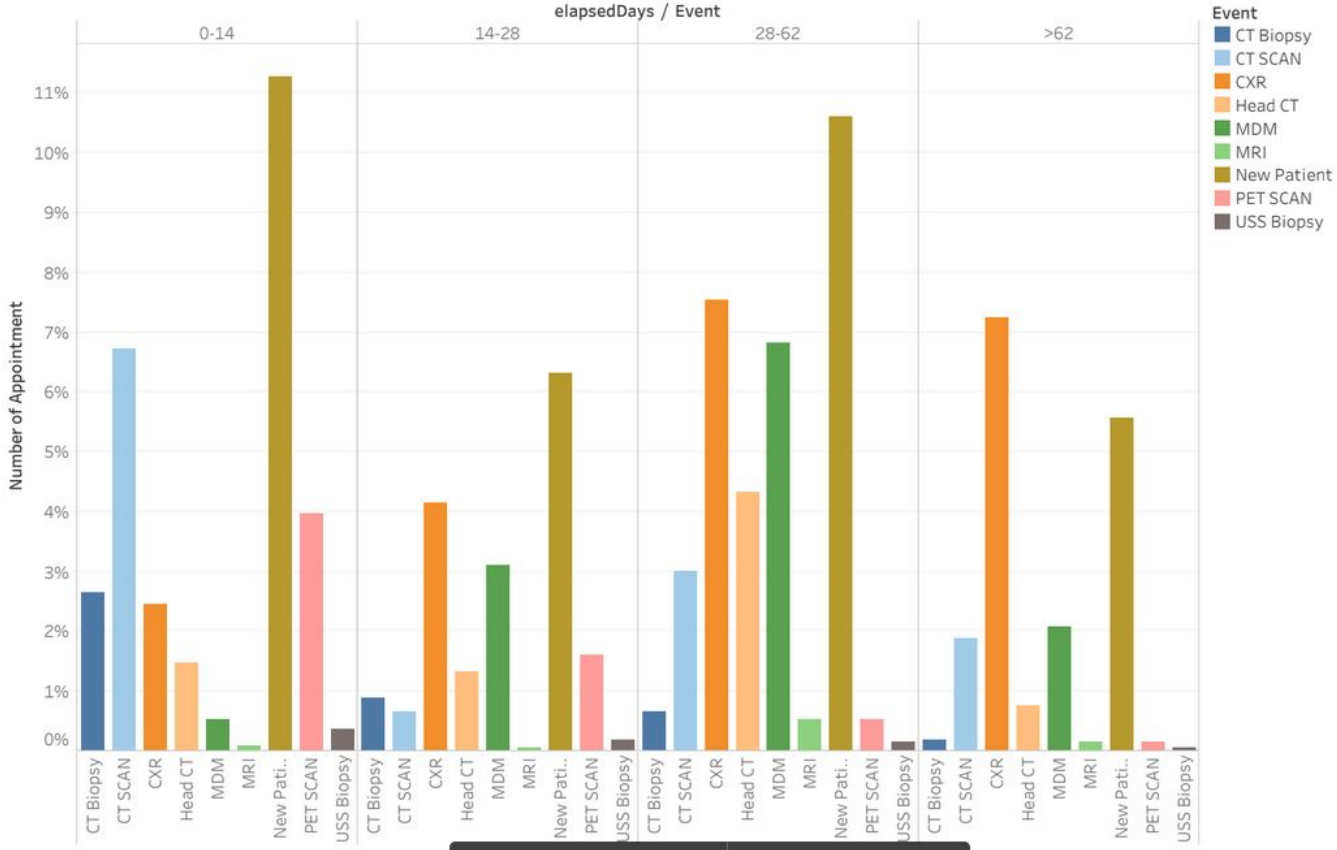
- Waiting for Christina/Dave to re-categorised event.

TOTAL_EVENTS	EVENT
1	(null)
1	General Surgery Return Patient
2	CT Chest/Abdo With Contrast,CT Chest/Abdo With Cont
1	(null)
1	RIE Respiratory Physiology New Patient
2	NM Lung Perfusion Scan (Q),NM Lung Perfusion Scan (
1	WGH TTE New Patient
3	Thoracic Surgery Consultant Return Patient,Thoracic
1	WGH TTE New Patient
1	Discussion - MDM - Lung
1	Respiratory Consultant Return Patient



	concise_pathway	total_patients
0	Further tests->Others	13
1	CT SCAN->Further tests->MDM->Others	11
2	CT SCAN->MDM->Others	7
3	Further tests->CXR->Others->MDM->CXR	6
4	Others	6
5	CT SCAN->Further tests->MDM->Others->CXR	5
6	CT SCAN->Further tests->MDM->Others->HEAD CT	5
7	CT SCAN->Further tests->MDM->Others->HEAD CT->CXR	5
8	Further tests->MDM->Others	5
9	Others->MDM	5
10	CT SCAN->Further tests->CXR->MDM->Others	4
11	CT SCAN->Further tests->CXR->MDM->Others->HEAD CT->CXR	4
12	CT SCAN->MDM->Others->CXR	4
13	Further tests->Others->MDM->CXR	4
14	CT SCAN	3
15	CT SCAN->CXR->Others->MDM->CXR	3
16	CT SCAN->Further tests->CXR->MDM->HEAD CT->Others->HEAD CT->CXR	3
17	CT SCAN->Further tests->CXR->MDM->Others->CT SCAN->CXR->CT SCAN	3
18	CT SCAN->Further tests->CXR->MDM->Others->CXR	3
19	CT SCAN->Further tests->Others	3
20	CT SCAN->Further tests->Others->MDM->CXR	3

Appointment/OrderItem Waiting Time



% of Total Number of Records for each Event broken down by elapsedDays. Color shows details about Event. The data is filtered on Event Start Date Year, which keeps 2018. The view is filtered on Event, which [illegible] OTHER, OTHER CT, OTHER US and OTHER XR.

THANK YOU