MITRE / FLUX NOTES **TREATMENT OPTIONS v1**

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Goals

1. Communicates advantages and disadvantages of various treatment options to the patient and clinician.

2. Presentation must be visual, clear, and *accessible*.

3. Data must be relevant and meaningful.

4. The patient should analyze her values and preferences, and NOT analyze data.

Requirements

1. Data must be filterable and personalizable. The user can control the criteria for the sample set along various dimensions such demographics, medical history, and genetics

2. Must support varying number of treatment options, from simply defined to complex.

3. Must be flexible in terms of types of data supported and shown/selected (survival rate, side effects, cost, etc.).

Further Considerations and Challenges

1. We must minimize our personal biases when balancing or interpreting metrics.

2. *Do not permit* the patient make a mistake in interpreting raw data! Example: the current plot shows survival time for live and deceased patients. The text gives 60 month survival rate, the goal of the chart. However, the graphical representation shows current survival time, mostly of live patients, which is NOT the same.

2. The different categories will have different amounts of data. It is very difficult to visually compare sparse to dense data, particulary with respect to outliers.

Metric and Criteria Selection

› **Patients like me criteria**   ✕ sex: male   ✕ BRCA1: positive   ✕ tumor size: 1-2 cm

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⌄ **Patients like me criteria**   ✕ sex: male   ✕ BRCA1: positive   ✕ tumor size: 1-2 cm

demographic
- ☐ age: 46-66
- ☐ race: white
- ☑ sex: male

genetics
- ☑ BRCA1: positive
- ☐ BRCA2: negative

pathology
- ☑ size: 1-2 cm
- ☐ HER2: negative
- ☐ ER: negative
- ☐ PR negative

disease history
- ☐ months since diagnosis: 0-1
- ☐ surgery: no
- ☐ radiation: no

an idea:

strongest determinants
- ☐ age: 46-66
- ☑ sex: male
- ☐ BRCA2: negative

⌄ **Patients like me criteria**   ✕ sex: male   ✕ BRCA1: positive   ✕ tumor size: 1-2 cm
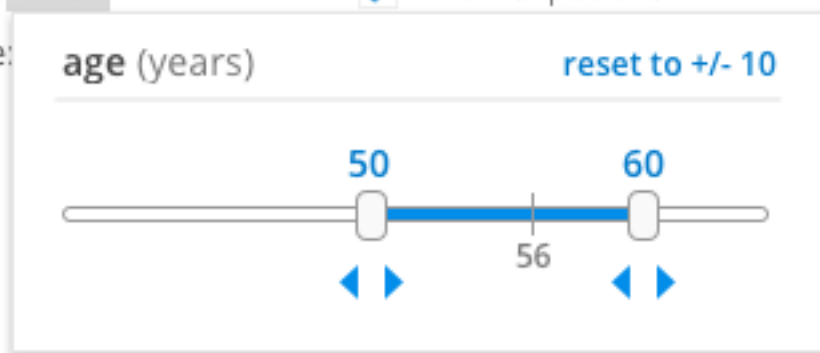
demographic
- ☑ age: 46-66
- ☐ race:
- ☑ sex:

genetics
- ☑ BRCA1: positive

disease history
- ☐ months since diagnosis: 0-1
- ☐ surgery: no
- ☐ radiation: no

age (years)   reset to +/- 10

50   **60**

56

◄ ►   ◄ ►

- ☐ PR negative

Patients like me criteria ✕ age: 50-60 ✕ sex: male ✕ BRCA1: positive ✕ tumor size: 1-2 cm

demographic
- ✓ age: 50-60
- ☐ race: white
- ✓ sex: male

genetics
- ✓ BRCA1: positive
- ☐ BRCA2: negative

pathology
- ✓ size: 1-2 cm
- ☐ HER2: negative
- ☐ ER: negative
- ☐ PR: negative

disease history
- ✓ months since diagnosis: 3-6

0-1
1-3
3-6
6-12
12+

- ☐ surgery: no
- ☐ radiation: no

Patients like me criteria ✕ age: 50-60 ✕ sex: male ✕ BRCA1: positive ✕ tumor size: 1-2 cm ✕ months since diagnosis: 1-3

demographic
- ✓ age: 50-60
- ☐ race: white
- ✓ sex: male

genetics
- ✓ BRCA1: positive
- ☐ BRCA2: negative

pathology
- ✓ size: 1-2 cm
- ☐ HER2: negative
- ☐ ER: negative
- ☐ PR: negative

disease history
- ✓ months since diagnosis: 1-3
- ☐ surgery: no
- ☐ radiation: no

> Patients like me criteria ✕ age: 50-60 ✕ sex: male ✕ BRCA1: positive ✕ tumor size: 1-2 cm ✕ time since diagnosis: 1-3 months

Metric and Criteria Selection

Some metrics will have a drop menu that selects between similar metrics that cannot be shown together. For example, different types of survival rates.

⌄ Show

    survival rates

☑ **Relative survival rate** ▾   textual description of relative survival rate, as opposed to other options

    quality of life indices

☐ **Quality of Life-Cancer Survivor**   textual description of relative survival rate, as opposed to other options

    side effects

☐ **Most common side effects**   another textual description of this evaluation

☑ **Side effects severity**   another textual description of this evaluation

    costs

☐ **Days expended**   another textual description of this evaluation

☑ **Out-of-pocket cost**   another textual description of this evaluation

☐ **Hospital stays**   another textual description of this evaluation

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> Display

    Relative survival rate   textual description of this evaluation

    Side effects severity   textual description of this evaluation

    Out-of-pocket cost   textual description of this evaluation

Show condensed, or display as list with descriptions to help patient understand what they are looking at.

> **Display**   cancer specific survival rate, 2 most common side effects

Table View

Tabular icon – ⊞

Each row contains the treatment name, then each selected metric. Survival rates can be displayed at multiple time points or as a distribution. This view is best for displaying many treatment options, with 2 or so different metrics. The user can easily compare a single metric across all treatments.

Cancer specific survival rate ▾

Textual description of relative survival rate

	distribution	**5 yr**	10 yr	15 yr	The 2 most common side effects with associated severity
surgery & radiation		96%			peripheral motor neuropathy **77%** ■ nausea **56%** ■
hormonal therapy		92%			anemia **92%** ■ nausea **35%** ■
chemotherapy		87%			neutropenia **74%** ■ blood clots **46%** ■
chemotherapy & radiation		82%			anemia **92%** ■ nausea **35%** ■
surgery		79%			neutropenia **74%** ■ blood clots **46%** ■
radiation		71%			anemia **92%** ■ nausea **35%** ■
none (actively monitoring)		69%			neutropenia **74%** ■ blood clots **46%** ■

Table View: Additional survival rate and side effects visualizations

relative survival rate ▾
textual description of relative survival rate, as opposed to other options

distribution   5 yr   10 yr   15 yr

treatment 1	15+	10-15	5-10	<5
treatment 2			

treatment 2   anemia 77% ▮   nausea 56% ▮

most common side effects

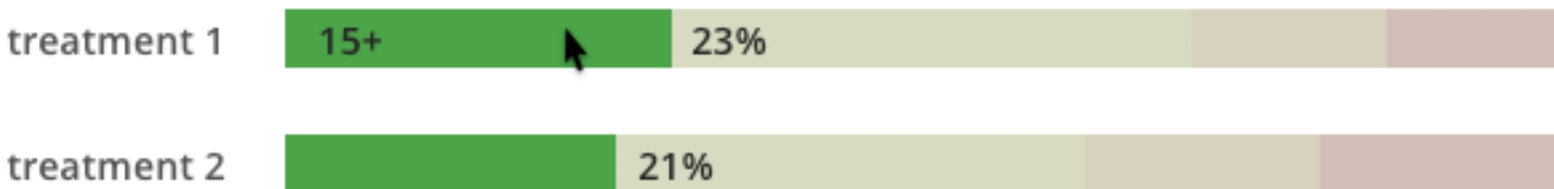|	% patients	average severity
anemia	77%	2.3
nausea	56%	2.1
effect 3	43%	3.1
another	36%	1.2

In place of the "distribution-5yr-10yr-15yr" picker, the default view is distribution. The user then clicks on a time period within one of the plots to focus the data in the table on that time period.

relative survival rate ▾
textual description of relative survival rate, as opposed to other options

treatment 1	15+	10-15	5-10	<5
treatment 2			

relative survival rate ▾
textual description of relative survival rate, as opposed to other options

treatment 1	15+	23%
treatment 2	21%	

relative survival rate ▾
textual description of relative survival rate, as opposed to other options

treatment 1	10 year	79%
treatment 2	71%	

Treatment Card View

Treatment Card Icon –

Each card presents the name of the treatment, the number of patients included in the pool, and a section for each metric. Each section supports a drilldown (on tap or mouse hover) that gives more details. This view accentuates each treatment as a whole, and helps the user digest all the dimensions of the treatment to form a complete picture.
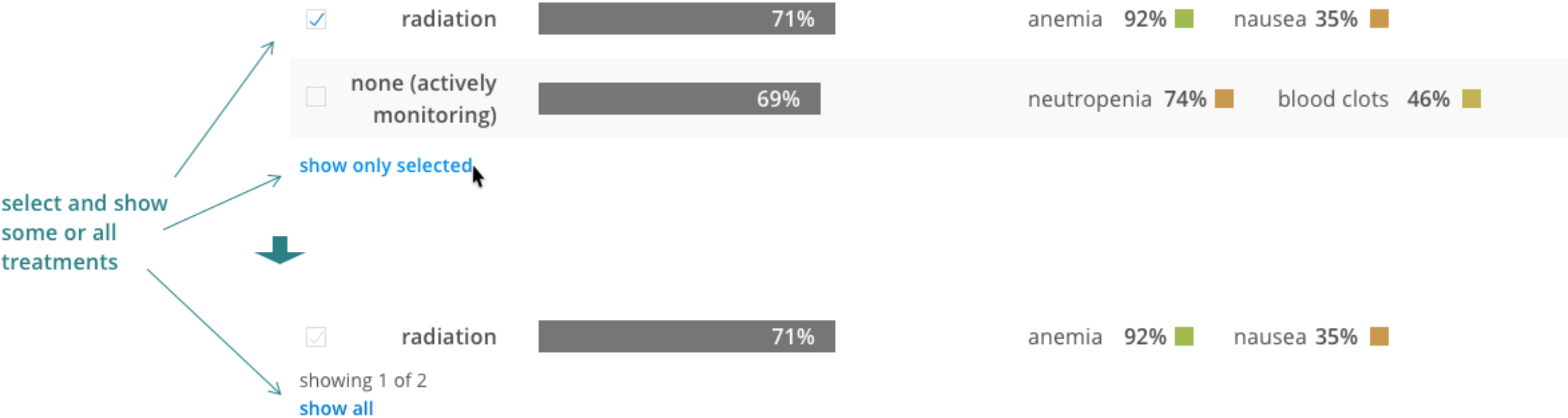
Comparisons, selections, and navigation

Use case: The user is presented with many treatment options and many possible metrics to compare across. To progress towards a final selection, she first whittles down the options by removing those treatments that have very poor efficacy for her cohort (e.g. comparing 10 year relative survival rates). She then compares the remaining 2 treatment options across many dimensions, such as side effects and costs.

This requires abilities to:
- **focus on select options and hide others**
- **switch between views**
- **sort by different metrics**

| ☑ | radiation | 71% | anemia **92%** 🟩 | nausea **35%** 🟧 |
| ☐ | **none (actively monitoring)** | 69% | neutropenia **74%** 🟧 | blood clots **46%** 🟨 |

show only selected

select and show some or all treatments

| ☑ | radiation | 71% | anemia **92%** 🟩 | nausea **35%** 🟧 |

showing 1 of 2

show all

Treatment Options

> **Patients like me criteria**   ✕ age: 50-60   ✕ sex: male   ✕ BRCA1: positive   ✕ tumor size: 1-2 cm   ✕ time since diagnosis: 1-3 months
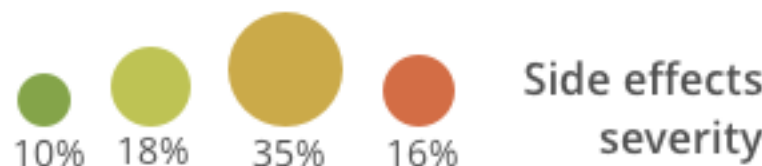
> **Display**   cancer specific survival rate, severity of side effects, annual OOP cost

Chemotherapy and radiation
27 patients
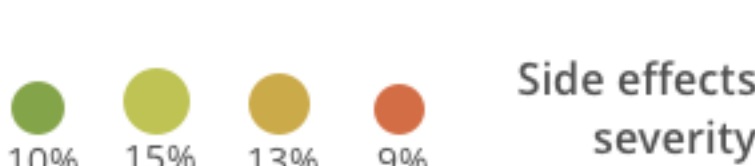
95%   15 year survival rate

10%   18%   35%   16%   **Side effects severity**

$12K   Annual OOP cost

Radiation
17 patients

66%   15 year survival rate

10%   15%   13%   9%   **Side effects severity**

$8K   Annual OOP cost

show only selected

Hybrid display that allows quick comparison across a single metric, and quick selection of therapies to view and compare across more detailed data.

Treatment Options

> **Patients like me criteria** ✗ age: 50-60 ✗ sex: male ✗ BRCA1: positive ✗ tumor size: 1-2 cm ✗ time since diagnosis: 1-3 months

> **Display** cancer specific survival rate, severity of side effects, annual OOP cost

Cancer specific survival rate

5 yr 10 yr 15 yr

surgery & radiation	98%	⬭
hormonal therapy	95%	⬭
chemotherapy	95%	⬭
chemotherapy & radiation	93%	🔵
surgery	93%	⬭
radiation	92%	🔵
none (actively monitoring)	91%	⬭

Chemotherapy and radiation
27 patients

95% 15 year survival rate

🟢 🟡 🟠 🔴 Side effects severity
10% 18% 35% 16%

$12K Annual OOP cost

Radiation
17 patients

66% 15 year survival rate
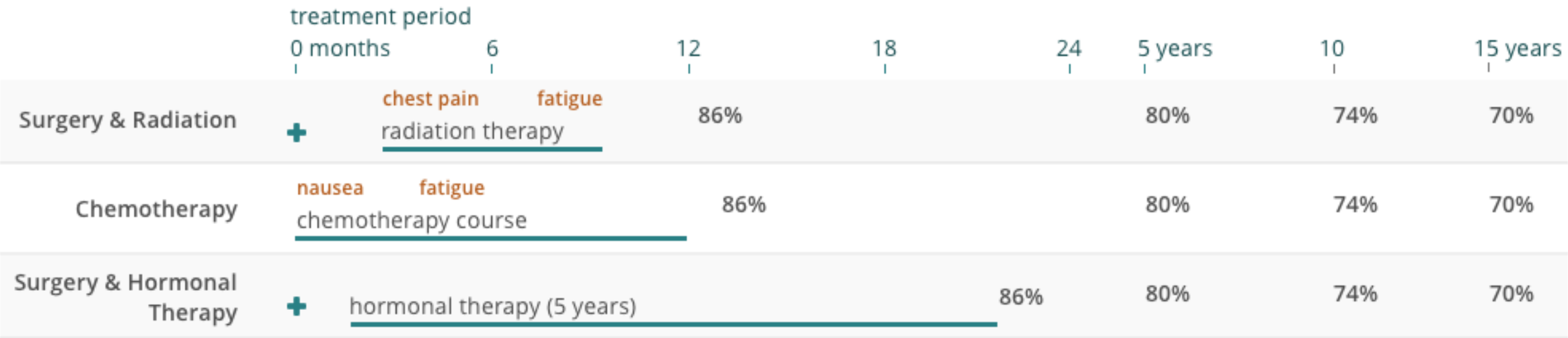
🟢 🟡 🟠 🔴 Side effects severity
10% 15% 13% 9%

$8K Annual OOP cost

Timelines

A way to present the general expected timecourse of the treatment, and expected outcomes. It can be decorated with additional informatino, such as expected side effects and survival rates.

Timelines could be a separate section after the table/cards, since it carries slightly different information, but it could also be a third display mode.

treatment period							
0 months	6	12	18	24	5 years	10	15 years

Surgery & Radiation	✚	chest pain fatigue radiation therapy	86%			80%	74%	70%
Chemotherapy		nausea fatigue chemotherapy course	86%			80%	74%	70%
Surgery & Hormonal Therapy	✚	hormonal therapy (5 years)		86%	80%	74%	70%	

common side effect

✚ surgery or operation

86% disease free rate

course of treatment