

The CHEUAL Breast Cancer Model: Interactive Cost-Utility Analysis to Support Decision Making

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Assessing Cancer Treatment

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Outline of the Presentation

- ◆ Context
- ◆ Challenge
- ◆ Research Strategy and Methodology
- ◆ CHEUAL BC Model development
- ◆ Model Validation
- ◆ Summary and reflections

Context

✓ Breast cancer is associated with substantial prevalence, incidence, morbidity and mortality.

0,08282% of Portuguese female population has BC (INE, 2005).

0,00962% new BC cases per year (European Observatory of Health, 2008).

Female BCRMR was 3,1% of all female number of death (INE, 2009) .

✓ Huge burden on both individuals and health systems.

Oncology represents the greater costs to the country, with a relative weight of 25,2% of total hospital costs. The major impact on expense was found to be attributable to antineoplastic and immunomodulator therapy, with a burden of 14.269.774€ per month (INFARMED, 2009).

Ministry of Health leads the spending cuts, with a decrease of 7% of the expense from 2010 to 2011 (Portuguese State Budget, 2011).

✓ Multiple alternative approaches to BC treatment.

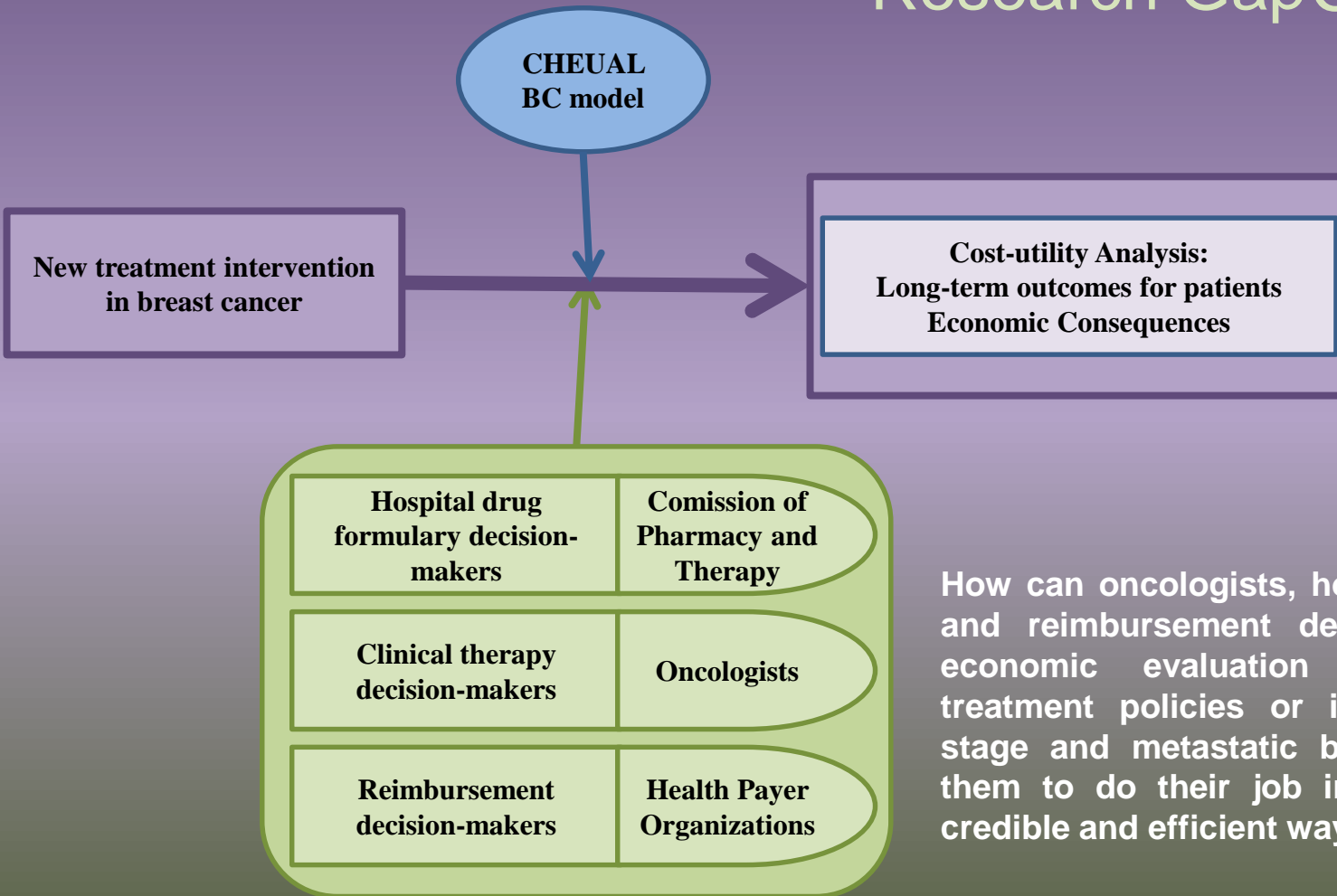
Aggregate treatment costs will rise quickly even if a treatment at the individual level is perceived to be inexpensive (Karnon & Jones, 2003).

✓ Mathematical modeling makes inferences about future economics and health outcomes to provide data to aid decision-making.

Decisions relating to the allocation of resources in fixed-budget healthcare systems are of extreme importance to cost-containment (ISPOR, 2007).

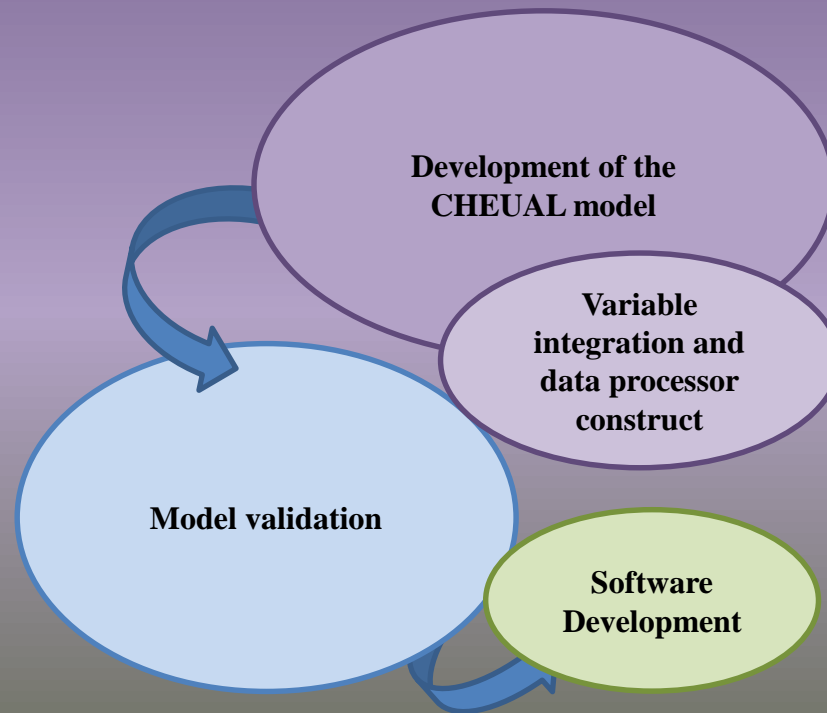
Challenge

Research Gap Closed



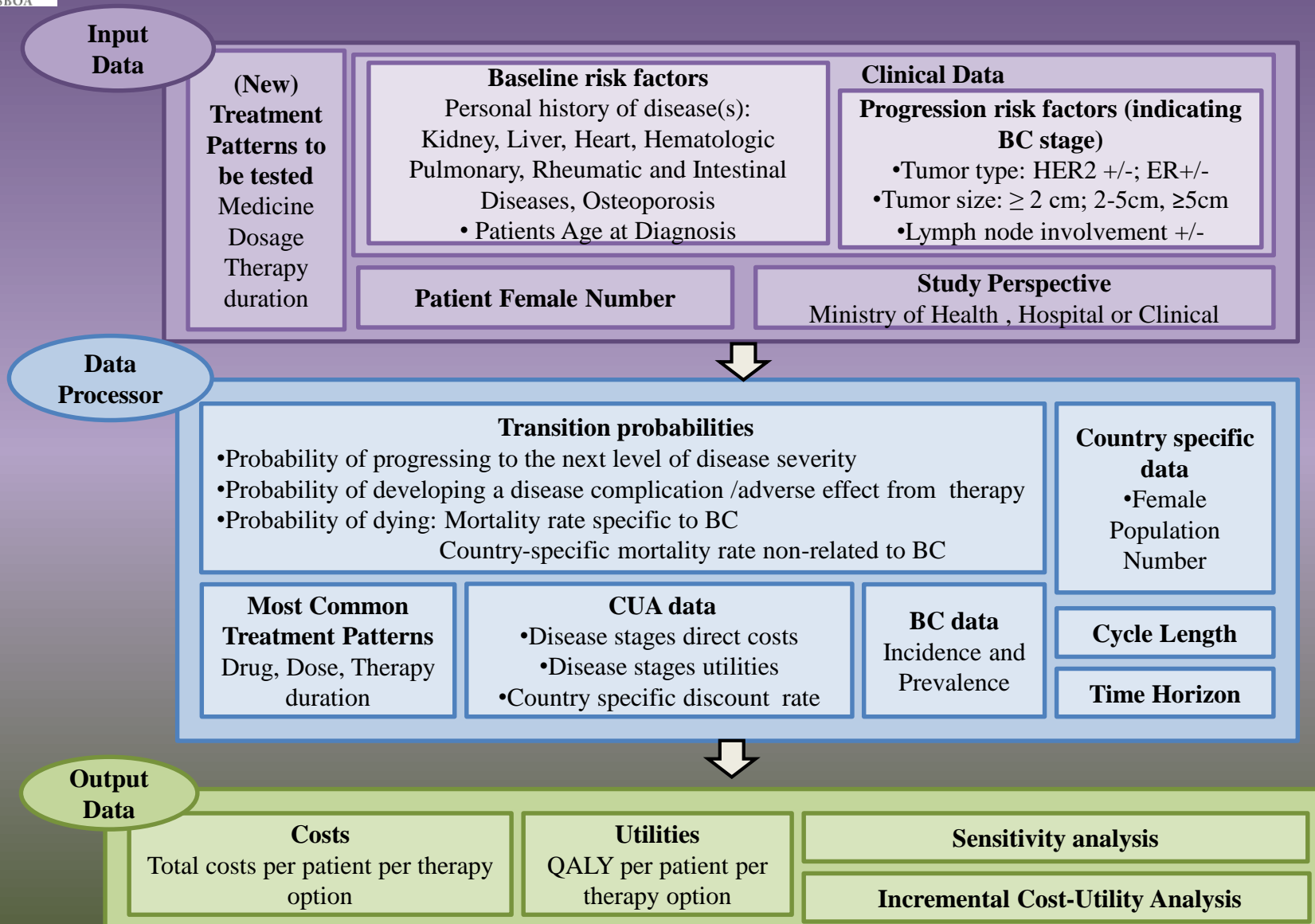
How can oncologists, hospital drug formulary and reimbursement decision-makers do an economic evaluation of pharmacological treatment policies or interventions in early stage and metastatic breast cancer, helping them to do their job in a fast, transparent, credible and efficient way?

Research Strategy and methodology



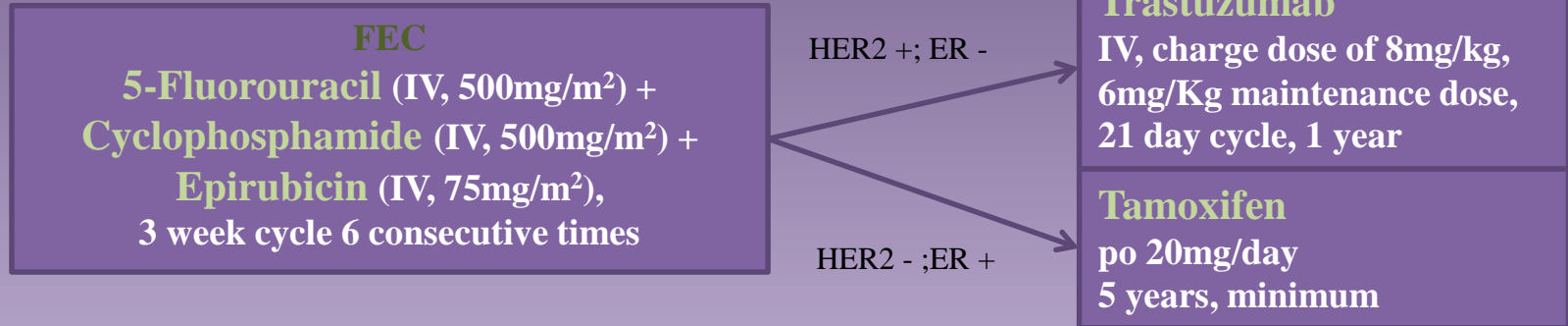
- Primary data: 200 Prescription Charts (most currently used therapy)
- Secondary data: Literature review (costs, consequences, other clinical and demographic data)

Model development: CHEUAL BC Model design

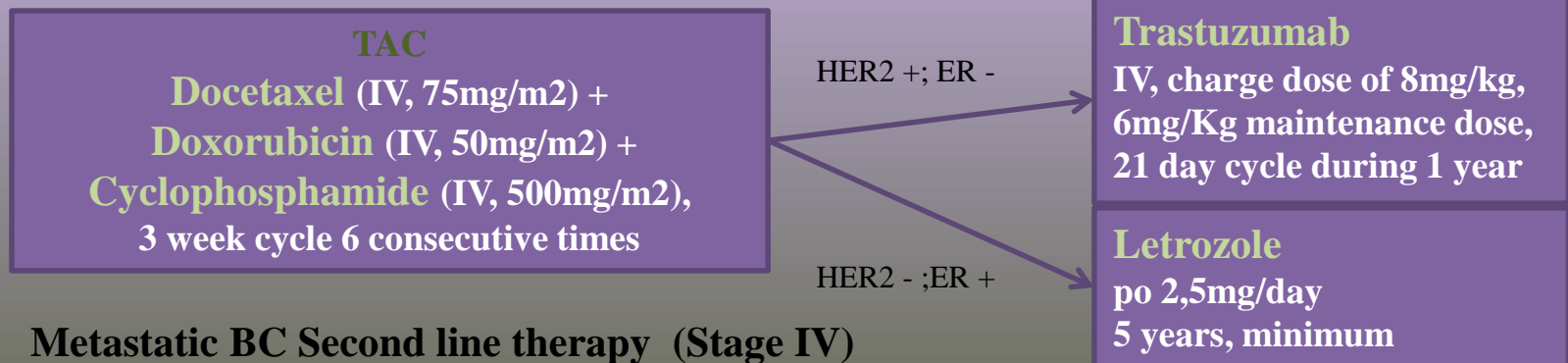


Model development: most currently used therapy

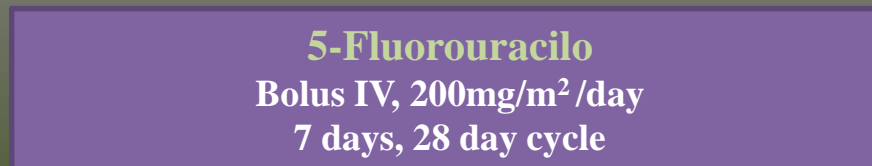
Early BC First line therapy (Stages 0, I and II)



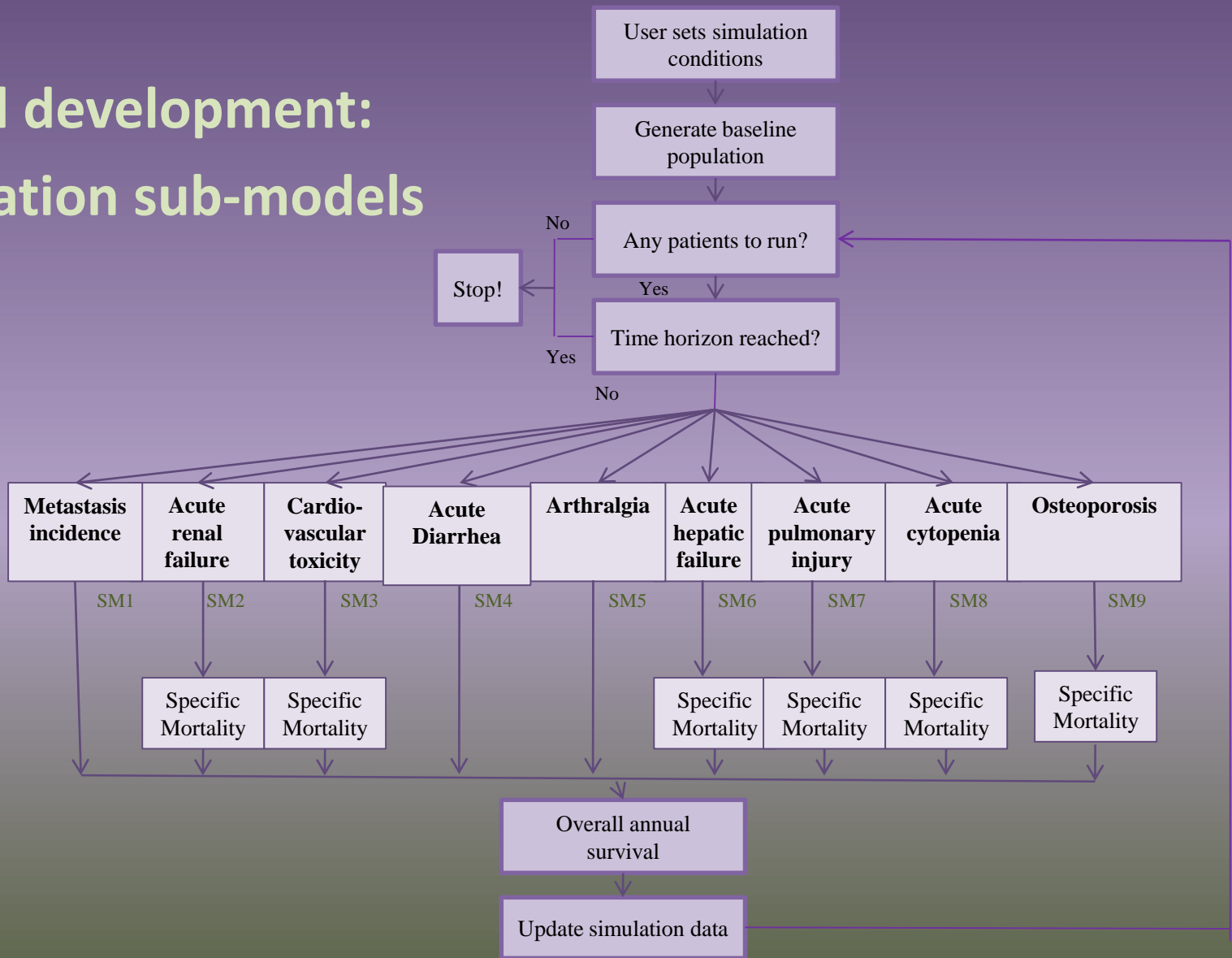
Early BC Second line therapy/ Metastatic BC First line therapy (Stage III)



Metastatic BC Second line therapy (Stage IV)

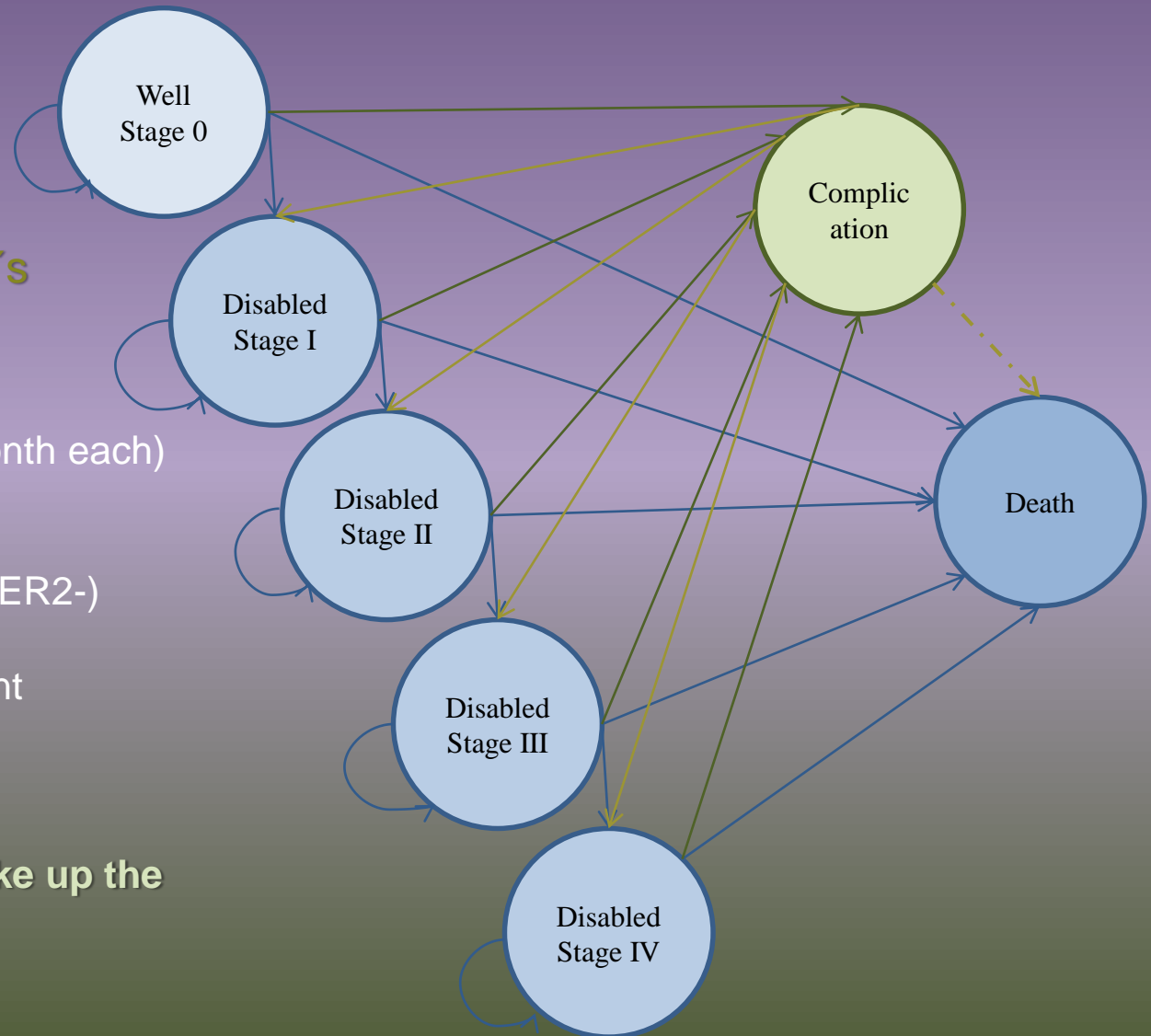


Model development: complication sub-models



Model development:

Markov Process Disease Progression Scheme



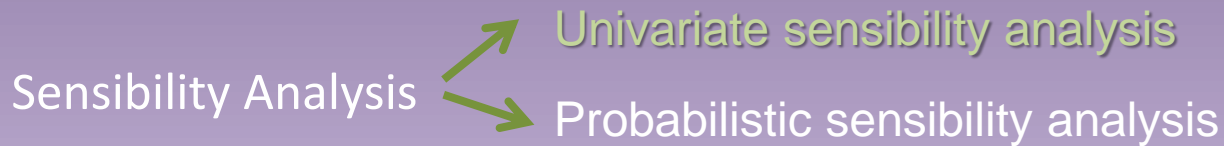
Open Matrix of Markov's Decision Process

- 5 stages of disease
- 20 cycles of transition (6 month each)
- Time horizon of 10 years
- 2 age groups (24-64; +65)
- 2 types of tumor (HER2+/ HER2-)
- 3 level of history of disease associated with BC treatment complications (0,1 e 2)
- 3 perspectives

720 Sub-Matrices that make up the CHEUAL model

Model Validation

➤ **Internal validity (inference of causality)**

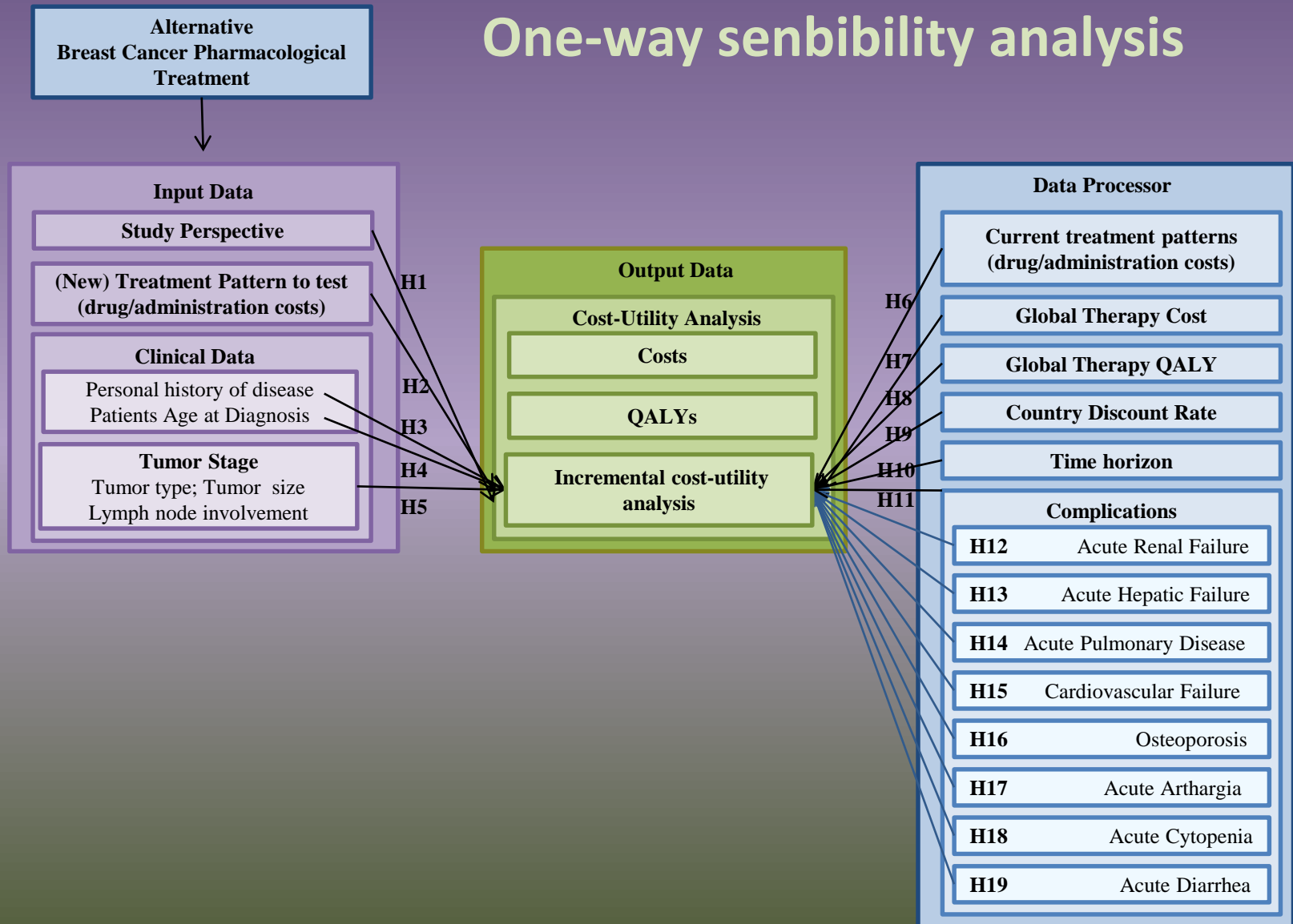


➤ **External validity (generalization)**

Comparing the results from model simulations with observed outcomes from published epidemiological and clinical studies used and not used to construct the model.

Model Validation:

One-way senbibility analysis



Model Validation:

One-way senbibility analysis results

	Variation (%)	Hypothesis Test	
Study perspective (NHS, Hospital, Clinical)	2,46	H1	x
New drug costs* ± 25%	13,52	H2	✓
Personal history of disease (0, 1 or 2)	14,67	H3	✓
Patients age at diagnosis (24-65 or +65)	42,94	H4	✓
Tumor stage (0, I, II, III and IV)	2636,42	H5	✓
Current treatment drug costs* ± 25%	4,34	H6	✓
Global BC costs ± 25%	66,67	H7	✓
Global BC QALYs ± 25%	66,67	H8	✓
Country discount rate (C/QALY: 5%/0% or 5%/5%)	55,13	H9	✓
Study time horizon (5 or 10 years)	101,80	H10	✓
Global complication incidence ± 25%	11,44	H11	✓
ARF ± 25%	0,75	H12	x
AHF ± 25%	6,06	H13	✓
APD ± 25%	0,87	H14	x
ACVD ± 25%	0,45	H15	x
Osteoporosis ± 25%	0,01	H16	x
AA ± 25%	0,22	H17	x
AC ± 25%	2,75	H18	✓
AD ± 25%	0,18	H19	x
*ambulatory day care visit, drug, and drug preparation and administration costs	Exclusion criteria: Variation ≤ 2,5%		

Summary and Reflections

- ◆ The CHEUAL BC model allows the identification of efficient BC management strategies and treatments that *are good value for money* in a transparent and efficient way.
- ◆ Is being adapted to a software, and may be used to other chronicle diseases (especially those with a higher budget impact) and worldwide.
- ◆ Due to lack of Portuguese data, the model is mainly based on data from clinical studies of other countries, where cultural differences in treatment protocols and differences with exclusion criteria were despised.
- ◆ The model does not take into account treatments received and healthcare costs incurred early in the course of the disease.
- ◆ It can also be extended to provide the perspective of society.
- ◆ This study indicates a step towards the future, although there is still much to be done.



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