BIOSISTEMAK

EUSKAL OSASUN IKERKUNTZA
INVESTIGACIÓN VASCA EN SALUD
BASQUE HEALTH RESEARCH

Osakidetza

EUSKO JAURLARITZA GOBIERNO VASCO
OSASUN SAILA
DEPARTAMENTO DE SALUD

VOICE — Value based healthcare for Outcomes In breast and lung Cancer in Europe
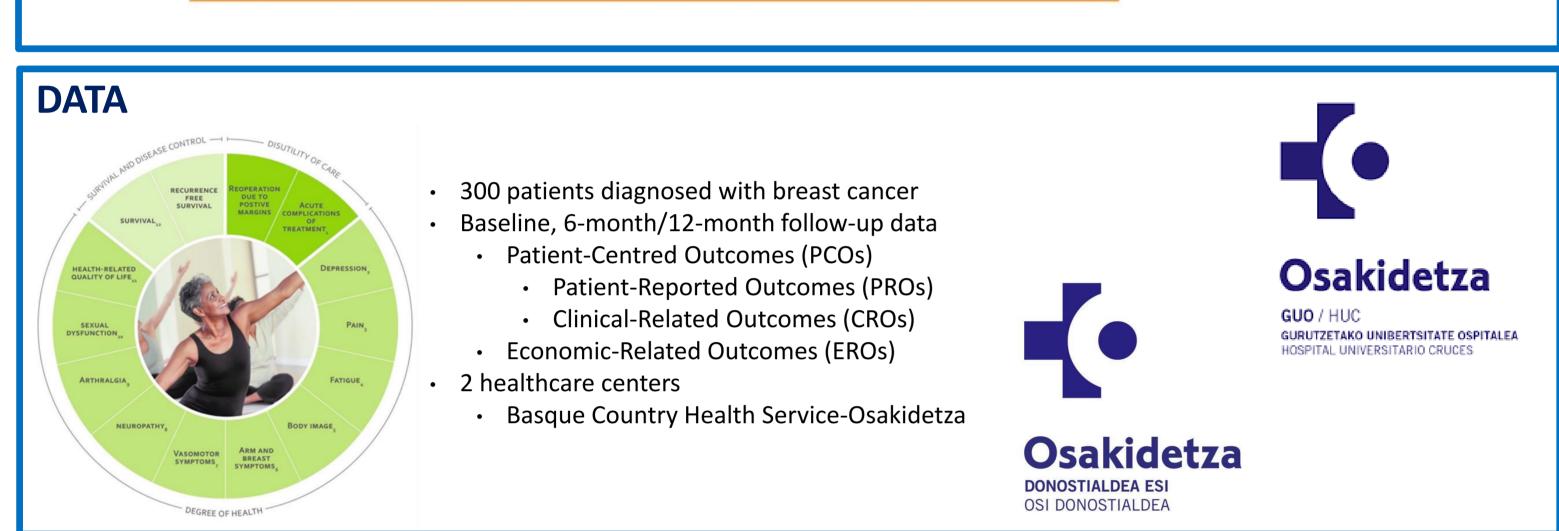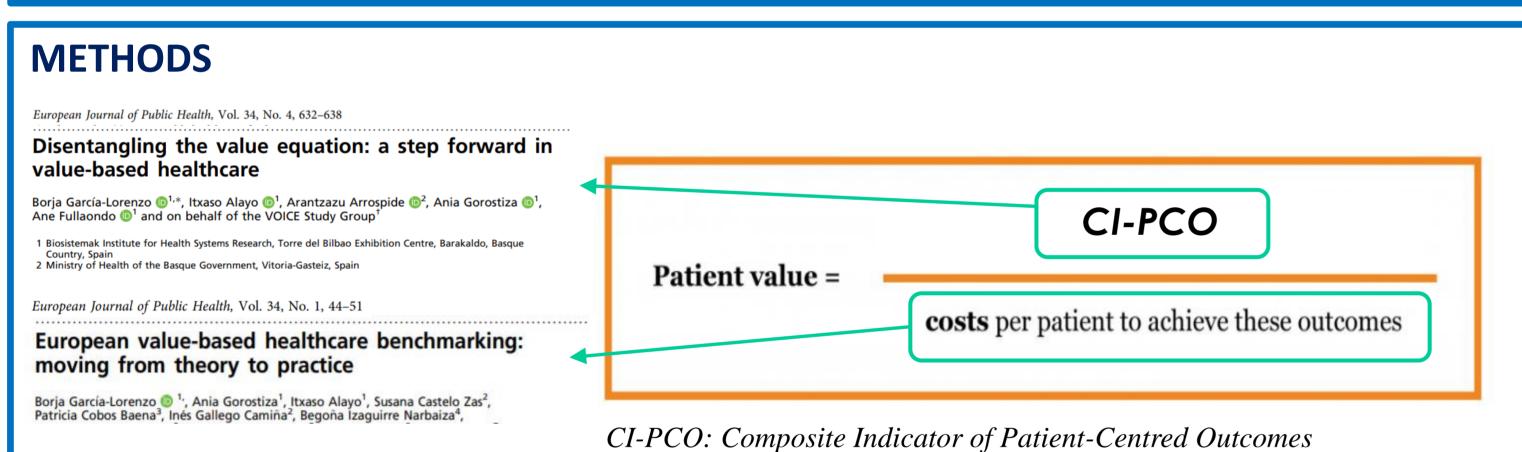
Roche

NEJM Catalyst

Bringing into play the value equation as a decision-making tool in value-based healthcare

Borja García-Lorenzo[1]; Arantzazu Arrospide[2]; Iker Ustarroz-Aguirre[3]; Ania Gorostiza[1]; Itxaso Alayo[1]; Teresa Acaiturri-Ayesta[3]; Marisol Blanco[4]; Izaskun Etxezarreta[4]; Carolina Varela-Rodríguez[5]; Elisa Gómez-Inhiesto[6] and Ane Fullaondo[1] on behalf of the VOICE study group
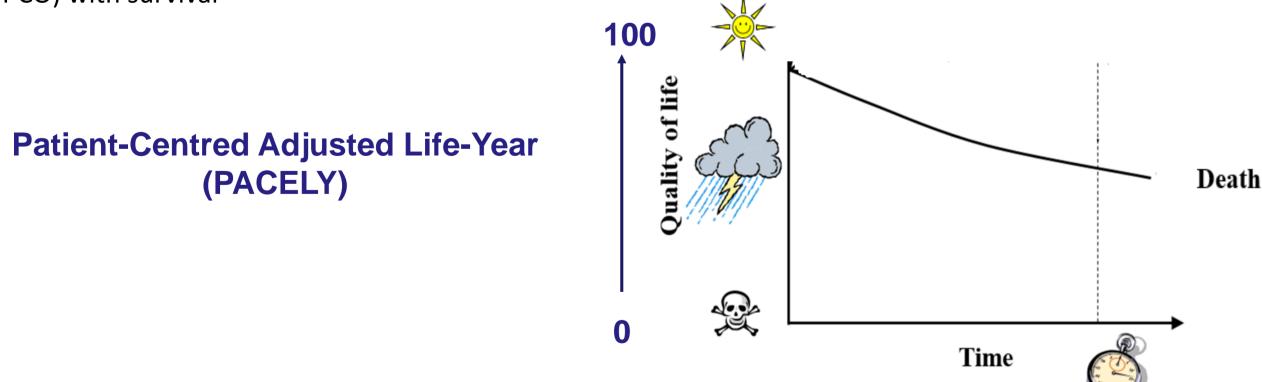
[1]Biosistemak Institute; [2]Health Department of the Basque Country Government; [3]Osakidetza Basque Health Service, Ezkerraldea Enkarterri Cruces Integrated Health Organisation; [4]Osakidetza Basque Health Service, Donostialdea Integrated Health Organisation; [5]Hospital Universitario 12 de Octubre; [6]Osakidetza Basque Health Service, Sub-directorate of Quality and Information System

RATIONALE

VOICE — Valued based healthcare for Outcomes in breast and lung Cancer in Europe

Osakidetza — DONOSTIA UNIBERTSITATE OSPITALEA HOSPITAL UNIVERSITARIO DONOSTIA

Osakidetza — GUO / HUC GURUTZETAKO UNIBERTSITATE OSPITALEA HOSPITAL UNIVERSITARIO CRUCES

Hospital Universitario JUAN RAMÓN JIMÉNEZ

Hospital Universitario 12 de Octubre — SaludMadrid

HCL — L'INSTITUT DE CANCÉROLOGIE

IPOPORTO

OLV Top in Zorg.

ISTITUTO SCIENTIFICO ROMAGNOLO PER LO STUDIO E LA CURA DEI TUMORI

The NEW ENGLAND JOURNAL of MEDICINE
What Is Value in Health Care?
Michael E. Porter, Ph.D.

How might the value equation be estimated and interpreted to be used as decisión-making tool?

$$\text{Patient value} = \frac{\text{patient-relevant outcomes}}{\text{costs per patient to achieve these outcomes}} = ?$$

DATA

- 300 patients diagnosed with breast cancer
- Baseline, 6-month/12-month follow-up data
  - Patient-Centred Outcomes (PCOs)
    - Patient-Reported Outcomes (PROs)
    - Clinical-Related Outcomes (CROs)
  - Economic-Related Outcomes (EROs)
- 2 healthcare centers
  - Basque Country Health Service-Osakidetza

Osakidetza — GUO / HUC GURUTZETAKO UNIBERTSITATE OSPITALEA HOSPITAL UNIVERSITARIO CRUCES

Osakidetza — DONOSTIALDEA ESI OSI DONOSTIALDEA

METHODS

European Journal of Public Health, Vol. 34, No. 4, 632-638
Disentangling the value equation: a step forward in value-based healthcare
Borja Garcia-Lorenzo, Itxaso Alayo, Arantzazu Arrospide, Ania Gorostiza, Ane Fullaondo on behalf of the VOICE Study Group
1 Biosistemak Institute for Health Systems Research, Torre del Bilbao Exhibition Centre, Barakaldo, Basque Country, Spain
2 Ministry of Health of the Basque Government, Vitoria-Gasteiz, Spain

European Journal of Public Health, Vol. 34, No. 1, 44-51
European value-based healthcare benchmarking: moving from theory to practice
Borja Garcia-Lorenzo, Ania Gorostiza, Itxaso Alayo, Susana Castelo Zas, Patricia Cobos Baena, Inés Gallego Camiña, Begoña Izaguirre Narbaiza,

$$\text{Patient value} = \frac{CI\text{-}PCO}{\text{costs per patient to achieve these outcomes}}$$

CI-PCO: Composite Indicator of Patient-Centred Outcomes

- Analogously to health economic evaluation and following the widely Quality Adjusted-Life Year (QALY) conceptual definition, which combines Health-Related Quality of Life (HRQoL) with survival, this research suggests the numerator of the value equation as the Patient-Centred Adjusted-Life-Year (PACELY), defined as the combination of the Composite Indicator of PCO (CI-PCO) with survival

Patient-Centred Adjusted Life-Year (PACELY)

- where $\overline{PACELY}_{ijt}$ is defined as the mean PACELY of patients i during the period $t = [t_0, t_1]$ admitted in the healthcare centre j, being $PACELY_{ijt}$ computed as follows:

$$PACELY_{ijt} = \frac{(CI\text{-}PCO_{ijt_0} + CI\text{-}PCO_{ijt_1})}{2} t$$

- Then, the **value of healthcare V_{jt}** of the healthcare centre j over time period t is estimated as follows:

$$V_{jt} = \frac{\overline{PACELY}_{ijt}}{\bar{C}_{ijt}}$$

and $\bar{C}_{ijt}$ was defined as the mean cost generated by patients i in the healthcare centre j over the patient pathway during the period t.

- Analogously to the incremental cost-effectiveness ratio (ICER) used in health economic evaluation, V_j might be transformed into an incremental measure suggested as the **Inverse Incremental Value (InIV)** between two healthcare centres HC_A and HC_B, taking the HC_A as reference, defined as follows:

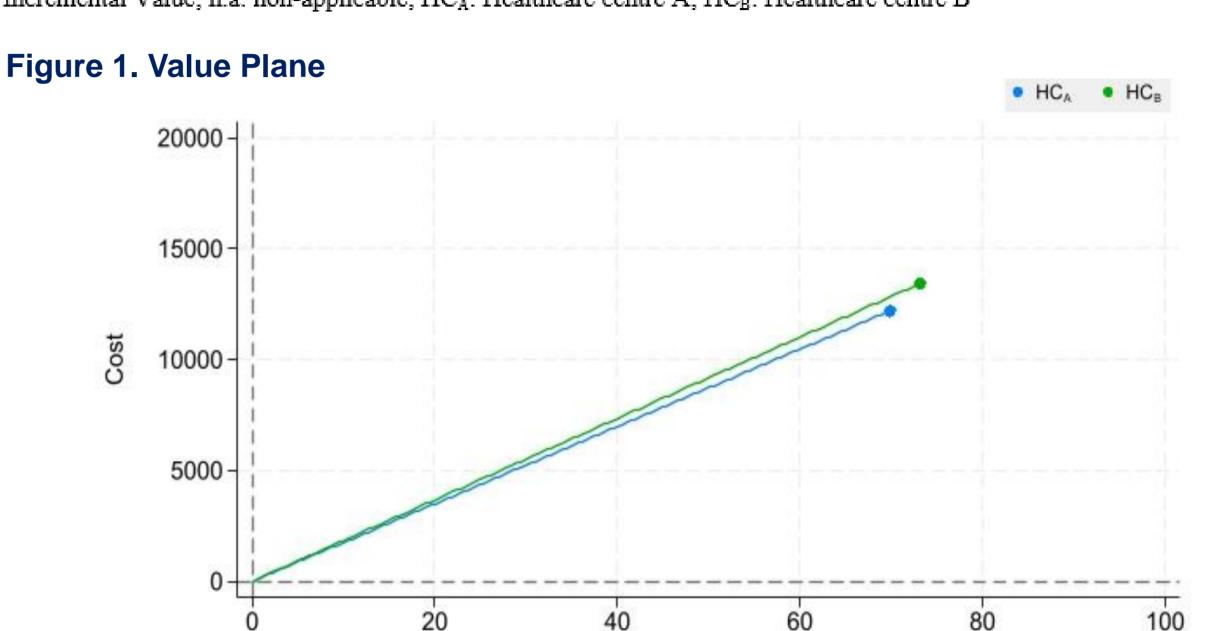$$InIV_{B,A} = \frac{\bar{C}_B - \bar{C}_A}{\overline{PACELY}_B - \overline{PACELY}_A}$$

- The $InIV_{B,A}$ provides the estimated cost at which the healthcare centre B is able to generate an additional PACELY compared to the reference centre defined as the healthcare centre A.

- In order to represent the uncertainty of V_{jt} estimation in the **Incremental Value Plane**, non-parametric bootstrap methods were applied allowing estimating the 95% confidence ellipses for V_{jt}. Analogously to health economic evaluation, a **Value Acceptability Curve** summarising the impact of uncertainty on the InV, frequently expressed as an InV in relation to possible values of the VBHC threshold, were drawn.

RESULTS

Table 1. Value-Based Healthcare results

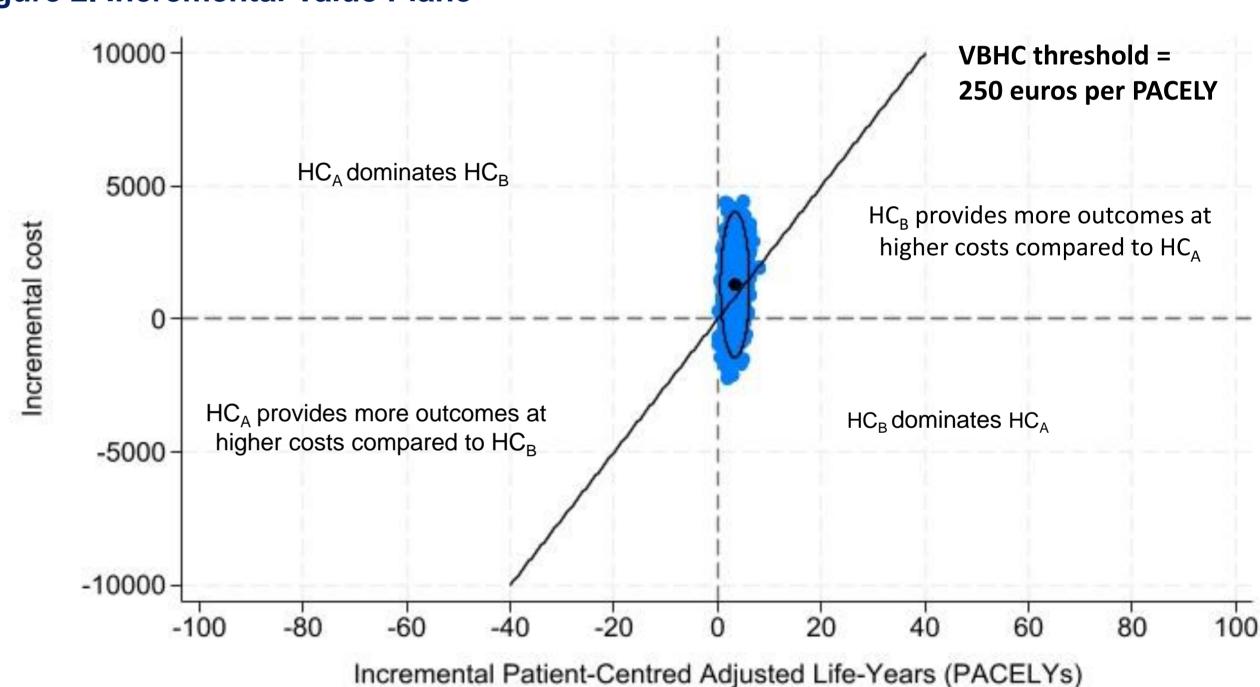|	N	Mean (sd) PACELY	Mean (sd) costs	V	InIV
HC_A	51	69.85 (7.54)	12,129 (6,600)	0.0075	
HC_B	240	73.15 (6.11)	13,404 (9,726)	0.0082	386
Incremental (HC_B − HC_A)	n.a.	3.30	1,275	0.0001	

PACELY: Patient Adjusted Life-Year; N: Sample size; sd: Standard deviation; V: Value; IV: incremental value; InIV: Inverse Incremental Value; n.a: non-applicable; HC_A: Healthcare centre A; HC_B: Healthcare centre B

Figure 1. Value Plane

- The slope of the curve linking the zero point to V_A is lower than that of V_B, showing the healthcare centre A providing a higher value than healthcare centre B.
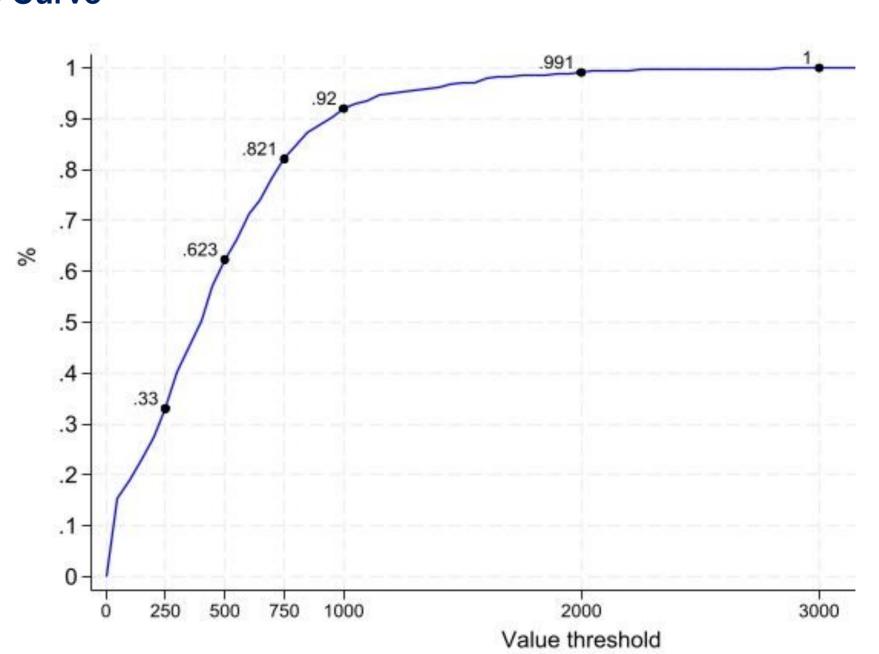
Figure 2. Incremental Value Plane

- InIV = 386 Euros per PACELY
  InIV simulations

- The $InIV_{B,A}$ shows the healthcare centre B providing more PACELYs at a higher cost compared to A. From a marginal perspective, the healthcare centre B is able to generate an additional PACELY at 386 euros compared to A.

- Following the decision rule, as the $InIV_{B,A}$ is located in the northeast quadrant, to draw any conclusion from an incremental approach regarding the added value of the healthcare centre B compared to A, the estimated cost per PACELY needs to be compared with the **VBHC threshold**.

- Being equivalent one QALY to one hundred PACELYs, and being the CE threshold of the Spanish health system estimated to lie in 25,000 Euros per QALY, the VBHC threshold might be estimated in 250 Euros per PACELY.

- Since the $InIV_{B,A}$ is higher than the VBHC threshold, in average, the value added by the healthcare centre B compared to A is not being providing according to the efficiency criteria.

- **InIV simulations** into 95% confidence ellipse and located in the northeast quadrant, show that healthcare B is providing more PACELYs at a higher cost compared to A

- **InIV simulations** into 95% confidence ellipse and located in the southeast quadrant, show that healthcare B is providing more PACELYs at a lower cost compared to A, i.e. healthcare B dominates A

Figure 3. Value Curve

- Considering a **VBHC threshold of 250 euros per PACELY**, the probability of the healthcare centre B compared to A providing an added value according to the efficiency criteria was 33%.

DISCUSSION

- This is the first proof-of-concept to estimate the figure of the value equation in VBHC

- Value equation can be interpreted using a health economic evaluation approach

- VBHC threshold has been assumed as a linear relationship of the Cost-Effectiveness (CE) threshold in Spain

- PCO at 12-months has been assumed to be the same that at 6-month