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S.E.N.R Sociedad Española de Neurorradiología

Análisis costo-económico del ICTU

M. Moreu

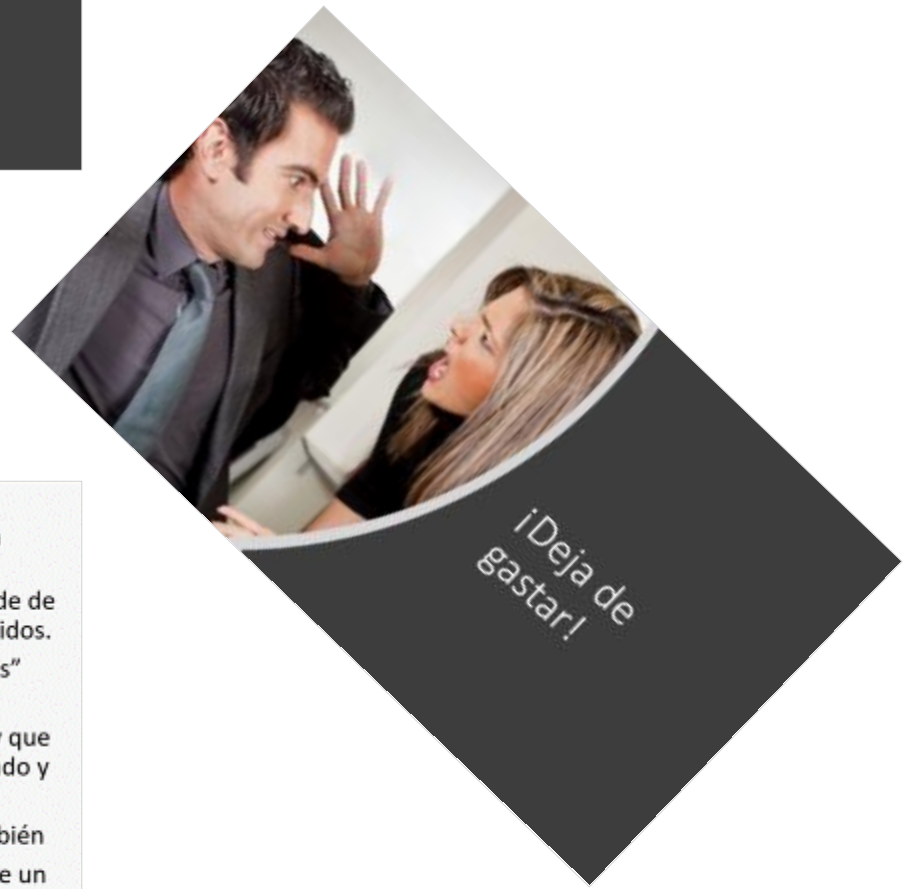
- *Hospital Clínico San Carlos*

Conflictos de intereses

Consultor	stryker® Neurovascular	balt inspiring innovation	cardiva®
Accionista	Medtronic		
Investigación	AngioNautix	stryker® Neurovascular	

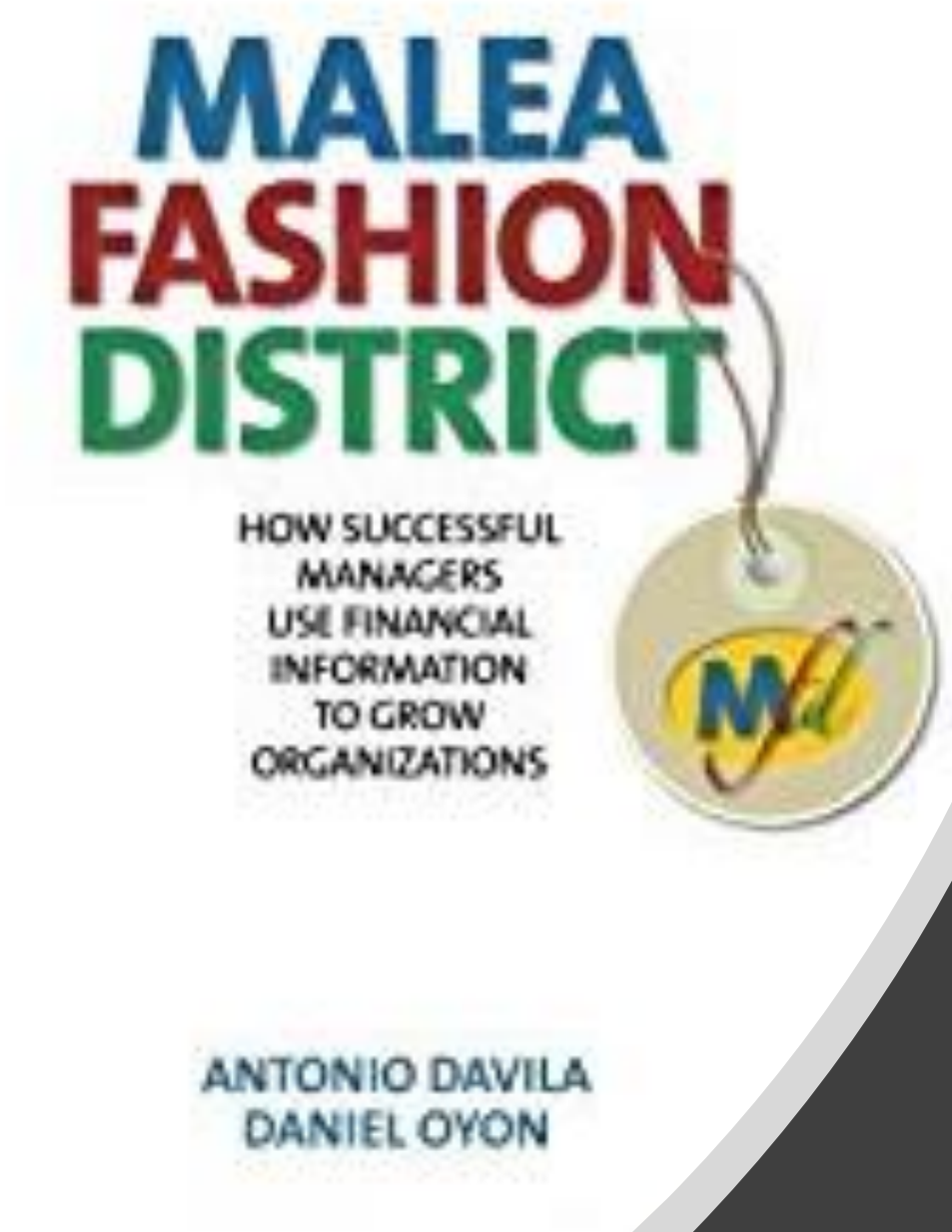
¿Qué es un modelo Markov?

1. Un tipo atractivo de Rusia
2. Un modelo de silicona para probar dispositivos
3. Un árbol de decisiones
4. El tipo de análisis que se realiza para una simulación de Montecarlo



Conclusiones

- Los estudios económicos manejan modelos teóricos.
  - La calidad del resultado depende de la calidad de los datos introducidos.
- Cuanto más complejos "más reales" pero menos manejables
- Para leer un artículo de costes hay que entender que modelo han empleado y que costes han usado
- Para fabricar nuestro modelo también
- La trombectomía mecánica supone un ahorro a largo plazo



Introducción a los estudios de costes

Estructura de costes

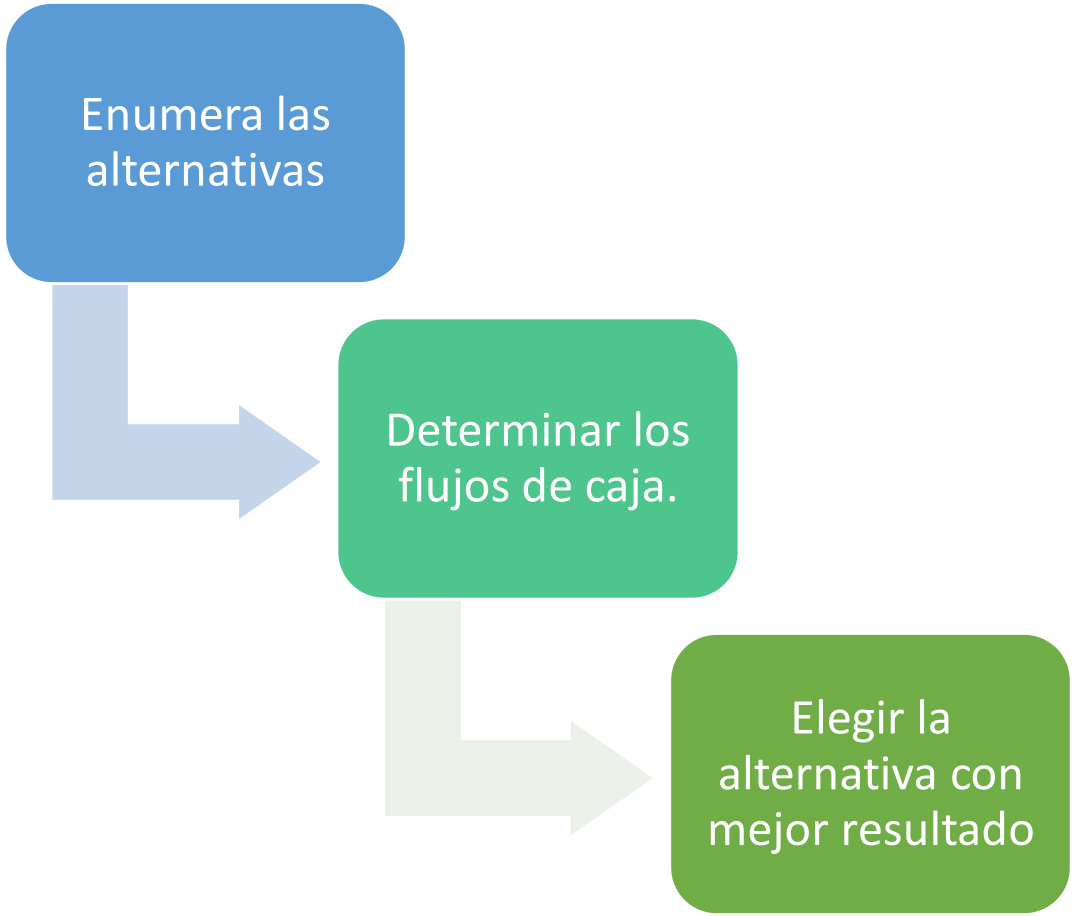
Directos: atribuidos a un proceso específico

- Costes laborales
- Costes de material

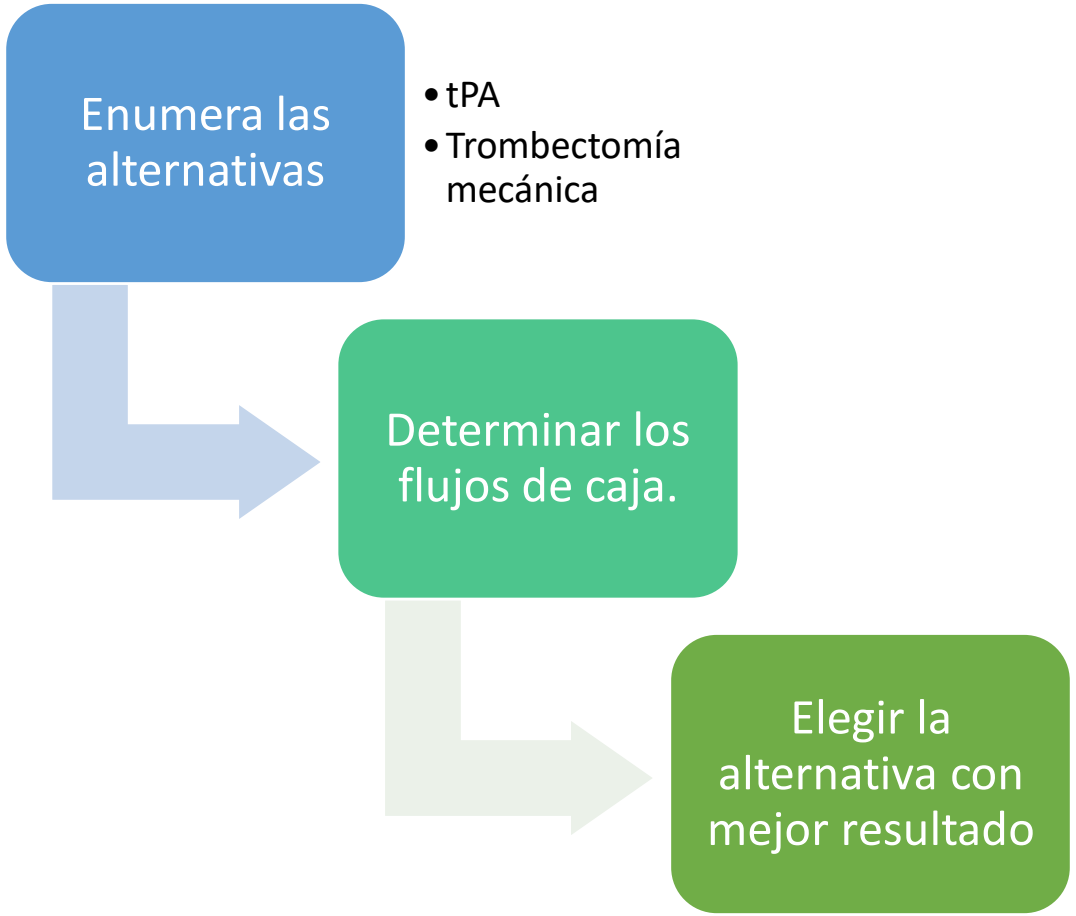
Indirectos: difíciles de asignar a un proceso.

- gastos de dirección
- Limpieza

Costes relevantes



Costes relevantes



Enumera las alternativas

Determinar los flujos de caja.

Elegir la alternativa con mejor resultado

Determinar los flujos de caja.

Mejor tratamiento médico	Agudo	Año 1	Año 2
Ambulancia			
Urgencias			
Procedimiento			
Ingreso			
Rehabilitación			
"Costes sociedad"			

Trombectomía mecánica	Agudo	Año 1	Año 2
Ambulancia			
Urgencias			
Procedimiento	10K		
Ingreso	↓		
Rehabilitación	↓	↓	
"Costes sociedad"	↓	↓	↓

Costes irrelevantes

Enumera las alternativas

Determinar los flujos de caja.

Elegir la alternativa con mejor resultado

Determinar los flujos de caja.

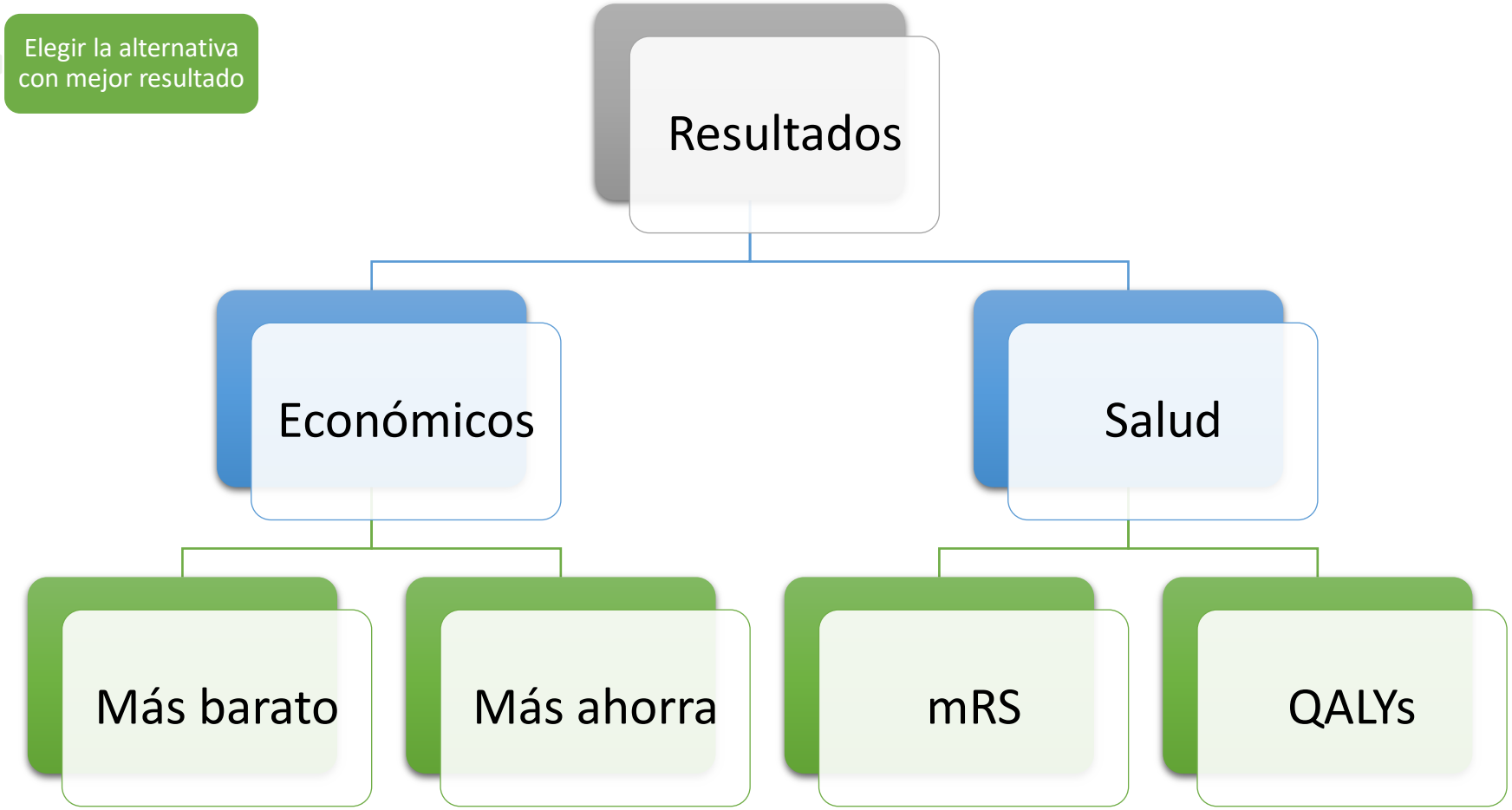
Sistema privado	• Sencillo con facturas
Sistema público o aseguradoras	• No estructura costes • Pago por GRD
España	• Más difícil (17 sistemas..o más)

Enumera las alternativas

Determinar los flujos de caja.

Elegir la alternativa con mejor resultado

Elegir la alternativa con mejor resultado



OPEN ACCESS

Original research

Quantified health and cost effects of faster endovascular treatment for large vessel ischemic stroke patients in the Netherlands

Henk van Voorst ,[1,2] Wolfgang G Kunz ,[3] Lucie A van den Berg,[4] Manon Kappelhof,[5,6] Floor M E Pinckaers,[7] Mayank Goyal ,[8] Myriam G M Hunink,[9,10] Bart Emmer,[11] Maxim Johan Heymen Laurence Mulder,[12] Diederik W J Dippel ,[13] J M Coutinho,[14] Henk A Marquering,[15,16] Hieronymus D Boogaarts,[17] Aad van der Lugt,[18] Wim H van Zwam ,[19] Yvo B W E M Roos,[14] Erik Buskens,[20] Marcel G W Dijkgraaf,[21] Charles B L M Majoie,[22] On behalf of the MR CLEAN Registry investigators

► Additional material is published online only. To view please visit the journal online (http://dx.doi.org/10.1136/neurintsurg-2020-017017).

For numbered affiliations see end of article.

Correspondence to
Henk van Voorst, Radiology and Nuclear Medicine, Amsterdam UMC Locatie AMC, Amsterdam 1105 AZ, The Netherlands; h.vanvoorst@amsterdamumc.nl

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ABSTRACT

Background The effectiveness of endovascular treatment (EVT) for large vessel occlusion (LVO) stroke severely depends on time to treatment. However, it remains unclear what the value of faster treatment is in the years after index stroke. The aim of this study was to quantify the value of faster EVT in terms of health and healthcare costs for the Dutch LVO stroke population.

Methods A Markov model was used to simulate 5-year follow-up functional outcome, measured with the modified Rankin Scale (mRS), of 69-year-old LVO patients. Post-treatment mRS was extracted from the MR CLEAN Registry (n=2892): costs per unit of time and Quality-Adjusted Life Years (QALYs) per mRS sub-score were retrieved from follow-up data of the MR CLEAN trial (n=500). Net Monetary Benefit (NMB) at a willingness to pay of €80 000 per QALY was reported as primary outcome, and secondary outcome measures were days of disability-free life gained and costs.

Results EVT administered 1 min faster resulted in a median NMB of €309 (IQR: 226;389), 1.3 days of additional disability-free life (IQR: 1.0;1.6), while cumulative costs remained largely unchanged (median:

of the survivors remain dependent on care.[2 3] T
outcomes have drastically improved in recent
with the introduction of endovascular trea
(EVT).[4] The beneficial effect of EVT is, h
highly time-dependent.[5] As a result, vari
cies that aim at reducing time delay from
neurologic deficit to EVT have been inv
However, it remains unclear what the
cost effects of faster EVT are in the ye
treatment.

Health outcomes and costs have
ation in the case of LVO stroke
burden results in a lower perceiv
higher demand on healthcar
the short- and long-term
studies have proven that
costs in the years after t
has become standard
tries worldwide,[10]
ficiencies remai
With the gro
negative
treatm

¿Cómo leer un artículo de costes?


Datos
Resultado

¿Qué hay dentro de la caja?

- Modelo
- Costes
- Resultado

Methods A Markov model was used to simulate 5-year follow-up functional outcome, measured with the modified Rankin Scale (mRS), of 69-year-old LVO patients. Post-treatment mRS was extracted from the MR CLEAN Registry (n=2892): costs per unit of time and Quality-Adjusted Life Years (QALYs) per mRS sub-score were retrieved from follow-up data of the MR CLEAN trial (n=500). Net Monetary Benefit (NMB) at a willingness to pay of €80 000 per QALY was reported as primary outcome, and secondary outcome measures were days of disability-free life gained and costs.

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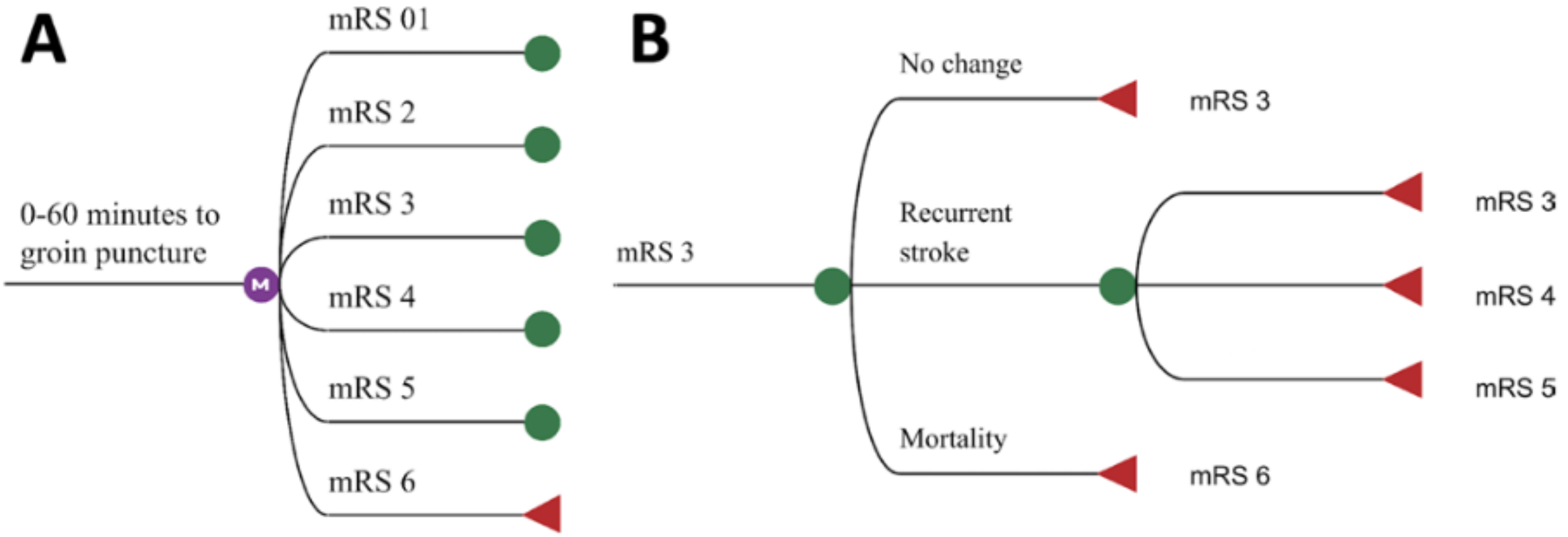

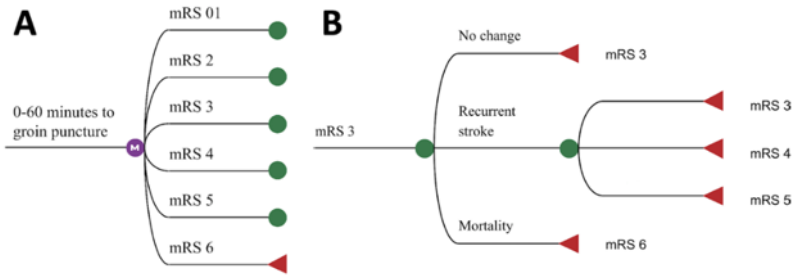

mRS	Coste
0	
1	
2	
3	
4	
5	
6	

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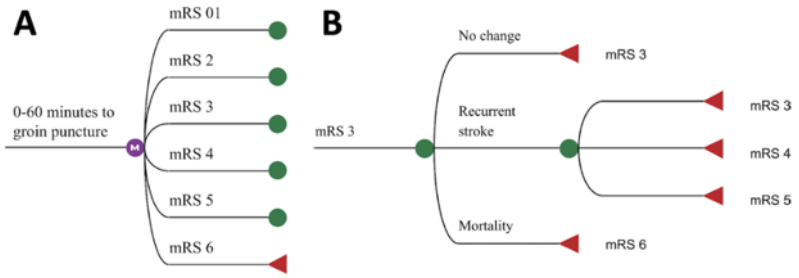
Two-year clinical follow-up of the Multicenter Randomized Clinical Trial of Endovascular Treatment for Acute Ischemic Stroke in The Netherlands (MR CLEAN): design and statistical analysis plan of the extended follow-up study



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Two-year clinical follow-up of the Multicenter Randomized Clinical Trial of Endovascular Treatment for Acute Ischemic Stroke in The Netherlands (MR CLEAN): design and statistical analysis plan of the extended follow-up study

Escenarios

- Análisis de variables basales
  - Edad
  - HTA
  - Resultado
  - …
- Estudio de sensibilidad
  - Pequeñas variaciones de cada variable

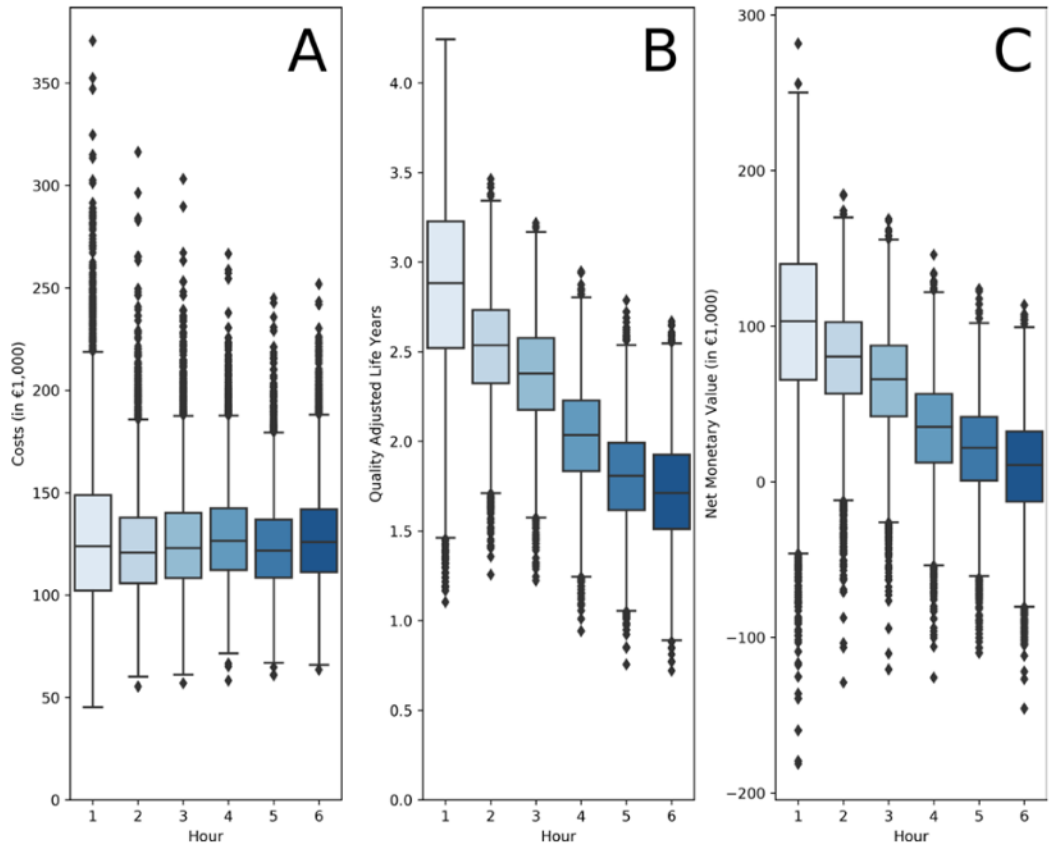


Figure 3 Probabilistic sensitivity analysis results per hour of delay from onset to groin puncture: Costs (A), quality-adjusted life-year (QALY) (B), and Net Monetary Value (C) per hour time from onset to groin puncture.

¡Deja de gastar!

¿Quién gasta?

¿Quién ahorra?

¿Coste o inversión?

TREATMENT COSTS	Units	Unit cost	Final cost
Mechanical thrombectomy			
Materials (number of units needed for the intervention)			
Stent retriever (Solitaire)	1.2	€3,300.00	€3,960.00
Guidewire (Avigo)	1.0	€312.00	€312.00
Intracranial catheter (Navien)/Balloon guide catheter (Cello)	1.1	€630.00	€693.00
Microcatheter (Rebar)	1.1	€656.24	€721.86
Introducer	1.0	€200.00	€200.00
Procedure pack[a]	1.0	€30.00	€30.00
Gloves	2.0	€0.50	€1.00
Diagnosis catheter	1.0	€56.42	€56.42
Contrast	1.0	€77.04	€77.04
PTA balloon catheter	0.2	€564.20	€112.84
Carotid stent	0.1	€1,129.00	€112.90
Personnel (number of hours of personnel needed for the intervention)			
Anaesthetist	2.0	€35.00	€70.00
Interventional neuroradiologist	3.0	€35.00	€104.99
Neurologist	2.0	€35.00	€70.00
Resident doctor	2.0	€12.15	€24.29
Nurse	6.0	€21.29	€127.73
Tests (number of tests required)			
Cranial computerised tomography scan	1.0	€82.04	€82.04
Computerised tomography angiography	1.0	€270.07	€270.07
Total			€7,026.17

Coste del procedimiento

Atención básica:
624,5 €

IV-tPA
1029 €

MT
7026 €

StrokEnomics™

SaludMadrid Hospital Universitario Clínico San Carlos

Impacto de la TM en presupuesto

Comunidad de Madrid

BIA for Comunidad de Madrid

- Hipótesis:
  - Esperamos 3439 MT de 2017 a 2021
  - Supervivencia postictus:

	Years post-stroke				
Strategy	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
MT + IV tPA	100 %	72,30 %	67 %	61,30 %	55,20 %
IV tPA	100 %	70,40 %	64,50 %	58,40 %	52 %

24.000.000 €

24.000.000 €

No

Eso es sólo el material

Necesitamos añadir:

- Coste agudo
- Coste complicaciones
- Coste a largo plazo

164.000.000 €

No

Eso es sólo el material

Necesitamos añadir:

- Coste agudo
- Coste complicaciones
- Coste a largo plazo

¿Qué hay dentro de la caja?

- Modelo
- Costes
- Resultado

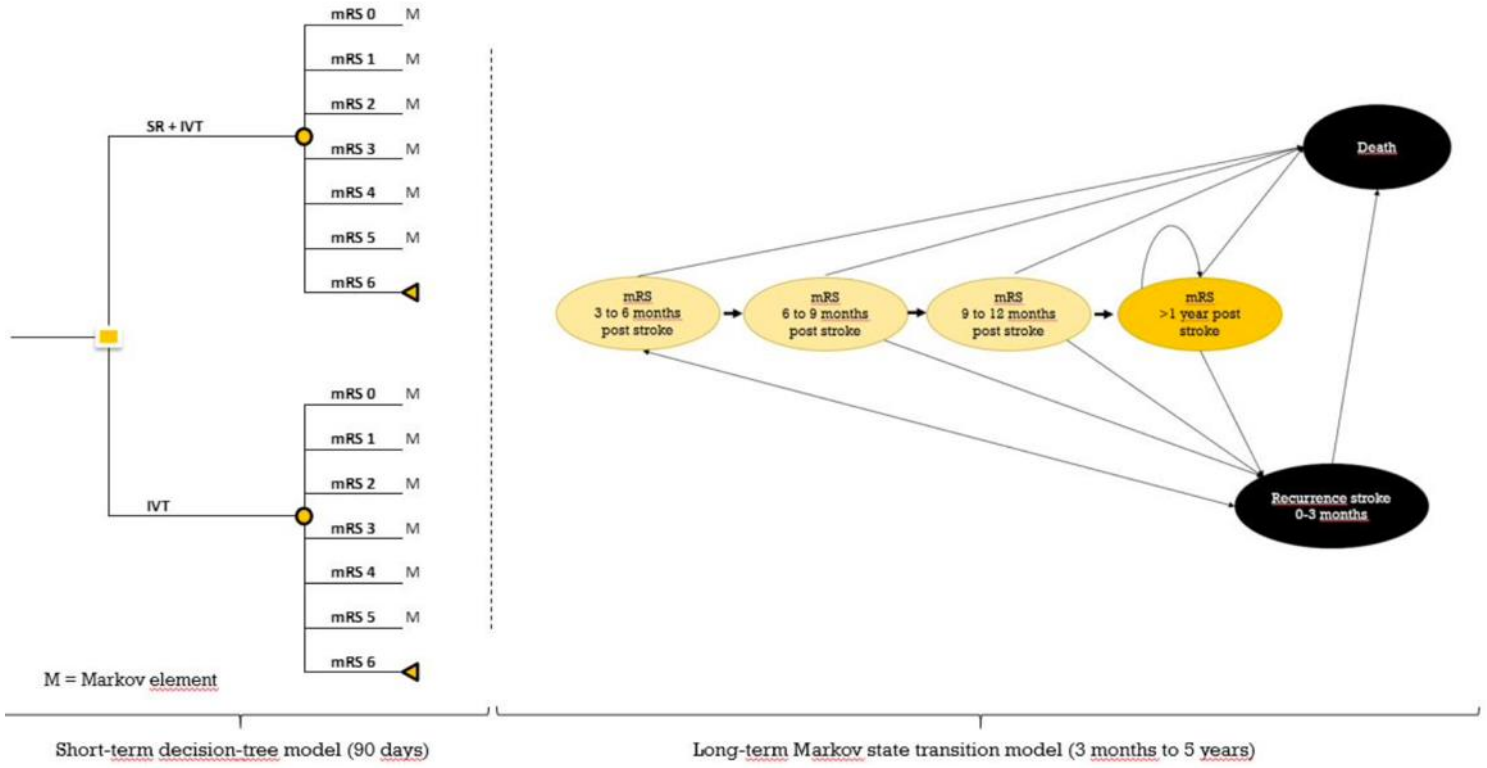
Modelo

Modelo

¿cuáles son mis alternativas?

- TM
- No TM

Modelo


mRS 0
mRS 1
mRS 2
mRS 3
mRS 4
mRS 5
mRS 6
M
SR + IVT
IVT
M = Markov element
Death
mRS 3 to 6 months post stroke
mRS 6 to 9 months post stroke
mRS 9 to 12 months post stroke
mRS >1 year post stroke
Recurrence stroke 0-3 months
Short-term decision-tree model (90 days)
Long-term Markov state transition model (3 months to 5 years)

Costes

Coste de los resultados

Table 2. Acute and long-term management costs.

	Acute and long-term management costs									
	Acute cost			*Annual long-term cost*						
Health state	Acute care cost[28]	Weight	Total acute care cost	Long-term care cost[28]	Weight	Long-term care total cost	Nursing and residential cost[29]	Weight	Nursing and residential total cost	Total
mRS 0	€5,070.00	0.90[a]	€4,563.00	€1,440.00	0.90[a]	€1,296.00	€1,533.40	0.90[a]	€1,380.06	€2,676.06
mRS 1	€5,070.00	1.00[a]	€5,070.00	€1,440.00	1.00[a]	€1,440.00	€1,533.40	1.00[a]	€1,533.40	€2,973.40
mRS 2	€5,070.00	1.10[a]	€5,577.00	€1,440.00	1.10[a]	€1,584.00	€1,533.40	1.10[a]	€1,686.74	€3,270.74
mRS 3	€6,951.00	0.90[a]	€6,255.90	€24,984.00	0.90[a]	€22,485.60	€9,488.60	–	€9,488.60	€31,974.20
mRS 4	€6,951.00	1.00[a]	€6,951.00	€24,984.00	1.00[a]	€24,984.00	€26,601.30	–	€26,601.30	€51,585.30
mRS 5	€6,951.00	1.10[a]	€7,646.10	€24,984.00	1.10[a]	€27,482.40	€37,701.40	–	€37,701.40	€65,183.80
mRS 6[30]	€3,912.75	1.00[a]	€3,912.75							

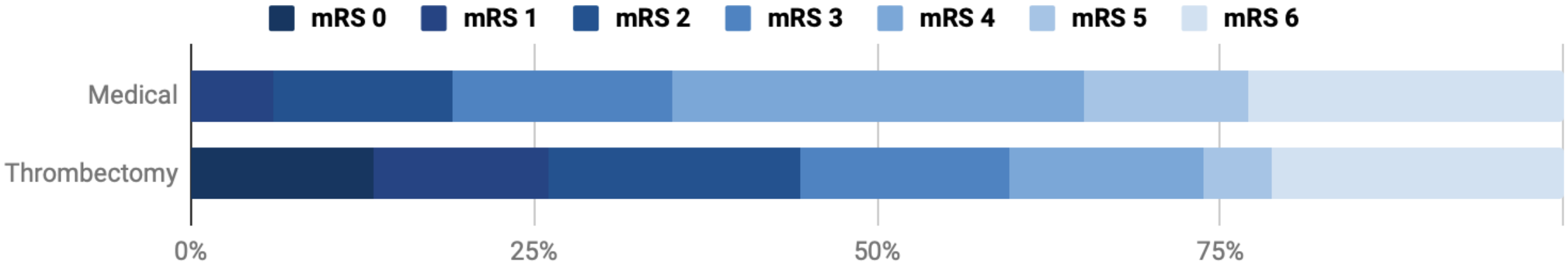
mRS: modified Rankin scale.
[a]Weights informed by expert clinical opinion.

de Andrés-Nogales, F., Álvarez, M., de Miquel, M. Á., Segura, T., Gil, A., Cardona, P., et al. (2017). Cost-effectiveness of mechanical thrombectomy using stent retriever after intravenous tissue plasminogen activator compared with intravenous tissue plasminogen activator alone in the treatment of acute ischaemic stroke due to large vessel occlusion in Spain. European Stroke Journal, 2(3), 272–284.

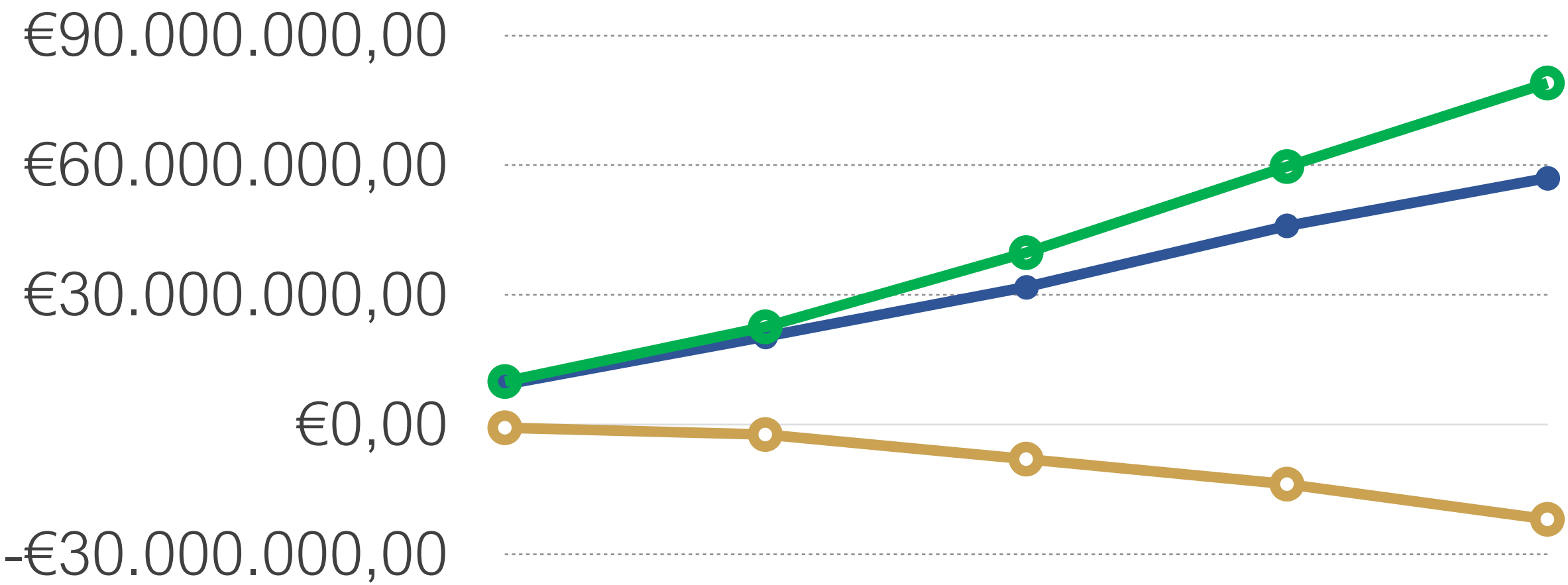
Coste de las complicaciones

Coste a largo plazo

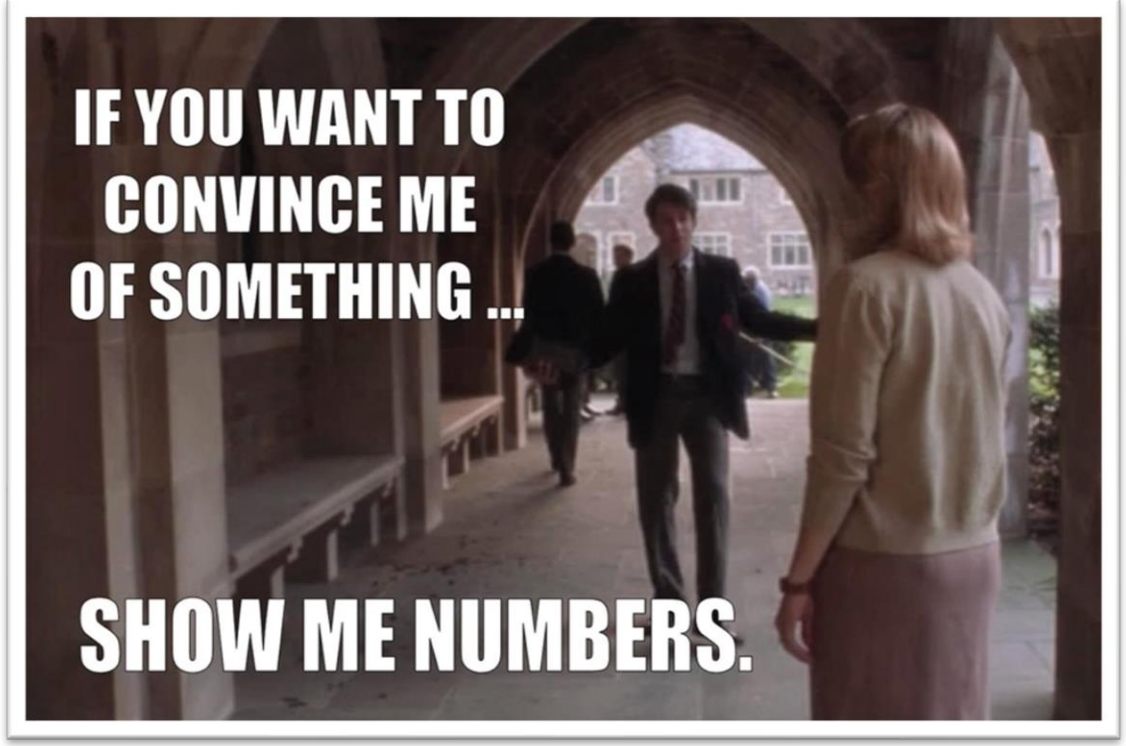
Año	1	2	3	4	5
Procedimiento	X	X	X	X	X
Complicación	X	X	X	X	X
Agudo	X	X	X	X	X
Largo plazo	X	XX	XXX	XXXX	XXXXX



Escenarios



Strategy	2017	2018	2019	2020	2021
MT + IV t-PA	9.917.957 €	22.806.228 €	34.727.659 €	50.461.563 €	62.695.355 €
IV t-PA alone	10.380.403 €	23.580.392 €	41.472.464 €	62.262.860 €	82.347.447 €
Medical costs difference	**-462.446 €**	**-774.164 €**	**-6.744.805 €**	**-11.801.296 €**	**-19.652.092 €**



Gastas
164.000.000€

En vez de
211.000.000€

Ahorras
46.000.000€

Sin tener en cuenta

Seguridad social

- Lo paga el Gobierno de España

Pérdida del trabajo

- Pérdida de ingresos públicos

Conclusiones

- Los estudios económicos manejan modelos teóricos.
  - La calidad del resultado depende de la calidad de los datos introducidos.
- Cuanto más complejos “más reales” pero menos manejables
- Para leer un artículo de costes hay que entender que modelo han empleado y que costes han usado
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¿Preguntas?

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