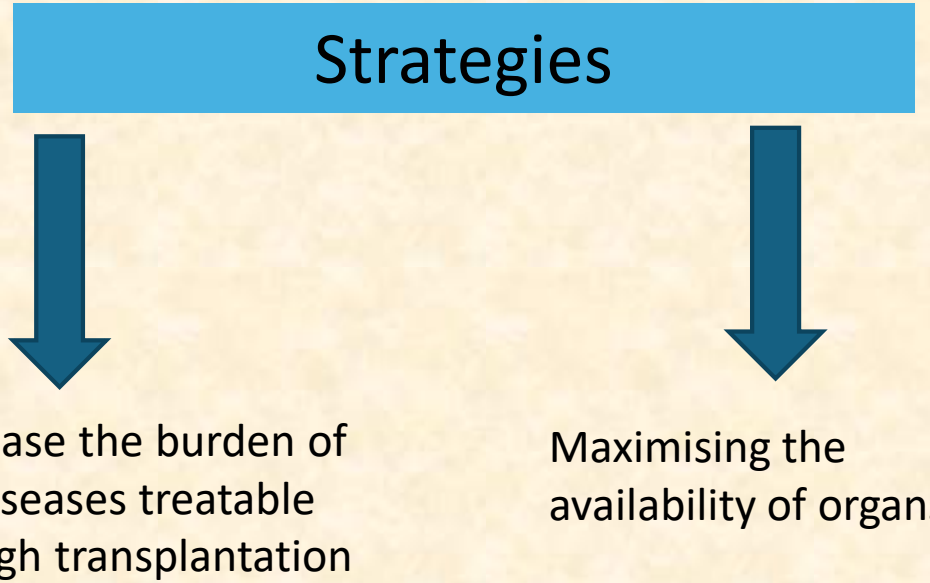
Δωρεά οργάνων: Η συμβολή των Μονάδων Εντατικής Θεραπείας

Φραντζέσκα Φραντζεσκάκη
Επίκουρη Καθηγήτρια Εντατικής Θεραπείας – Πνευμονολογίας
Β'Παν/κή Κλινική Εντατικής Θεραπείας
ΠΓΝ ΑΤΤΙΚΟΝ

3rd WHO Global Consultation on Organ Donation and Transplantation (Madrid 2010)

Self sufficiency in transplantation: Satisfy the needs of pts by using resources from their own population

Donation: A consideration in every end-of life care pathway



Critical pathways for organ donation*

Possible deceased organ donor

A patient with a devastating brain injury or lesion or a patient with circulatory failure and apparently medically suitable for organ donation

Treating physician to identify/refer a potential donor

Donation after circulatory death (*DCD*)

Potential *DCD* donor

A. A person whose circulatory and respiratory functions have ceased and resuscitative measures are not to be attempted or continued.

or

B. A person in whom the cessation of circulatory and respiratory functions is anticipated to occur within a time frame that will enable organ recovery.

Eligible *DCD* donor

A **medically suitable** person who has been **declared dead** based on the irreversible absence of circulatory and respiratory functions as stipulated by the law of the relevant jurisdiction, within a time frame that enables organ recovery.

Actual *DCD* donor

A consented eligible donor:

A. In whom an **operative incision** was made with the intent of organ recovery for the purpose of transplantation.

or

B. From whom at least **one organ was recovered for** the purpose of transplantation.

Utilized *DCD* donor

An actual donor from whom **at least one organ was transplanted**.

Reasons why a potential donor does not become a utilized donor

System

- *Failure to identify/refer a potential or eligible donor*
- *Brain death diagnosis not confirmed*
  (e.g. does not fulfill criteria) or completed
  (e.g. lack of technical resources or clinician to make diagnosis or perform confirmatory tests)
- *Circulatory death not declared within the appropriate time frame.*
- *Logistical problems (e.g. no recovery team)*
- *Lack of appropriate recipient (e.g. child, blood type, serology positive)*

Donor/Organ

- *Medical unsuitability (e.g. serology positive, neoplasia)*
- *Haemodynamic instability/unanticipated cardiac arrest*
- *Anatomical, histological and/or functional abnormalities of organs*
- *Organs damaged during recovery*
- *Inadequate perfusion of organs or thrombosis*

Permission

- *Expressed intent of deceased not to be donor*
- *Relative's refusal of permission for organ donation*
- *Refusal by coroner or other judicial officer to allow donation for forensic reasons*

Donation after braindeath (*DBD*)

Potential *DBD* donor

A person whose clinical condition is suspected to fulfill brain death criteria.

Eligible *DBD* donor

A **medically suitable** person who has been **declared dead** based on neurologic criteria as stipulated by the law of the relevant jurisdiction.

Actual *DBD* donor

A consented eligible donor:

A. In whom an **operative incision** was made with the intent of organ recovery for the purpose of transplantation.

or

B. From whom at least **one organ was recovered** for the purpose of transplantation.

Utilized *DBD* donor

An actual donor from whom **at least one organ was transplanted.**

**The "dead donor rule" must be respected That is, patients may only become donors after death, and the recovery of organs must not cause a donor's death*

GLOBAL ACTIVITY IN ORGAN DONATION & TRANSPLANTATION
ESTIMATIONS 2024

Kidney	Liver	Heart	Lung	Pancreas	S. bowel
110 467	42 497	10 287	8 236	2 066	174

≈ 173 727 solid organ transplants

≈ 2 % increase vs 2023

≤ 10% of global needs

37% living kidney transplants

23% living liver transplants

47 180 deceased donors (33 814 DBD and 13 366 DCD donors)

Information of 92 Member States on organ transplantation activities (75% of the total population)

https://www.transplant-observatory.org/

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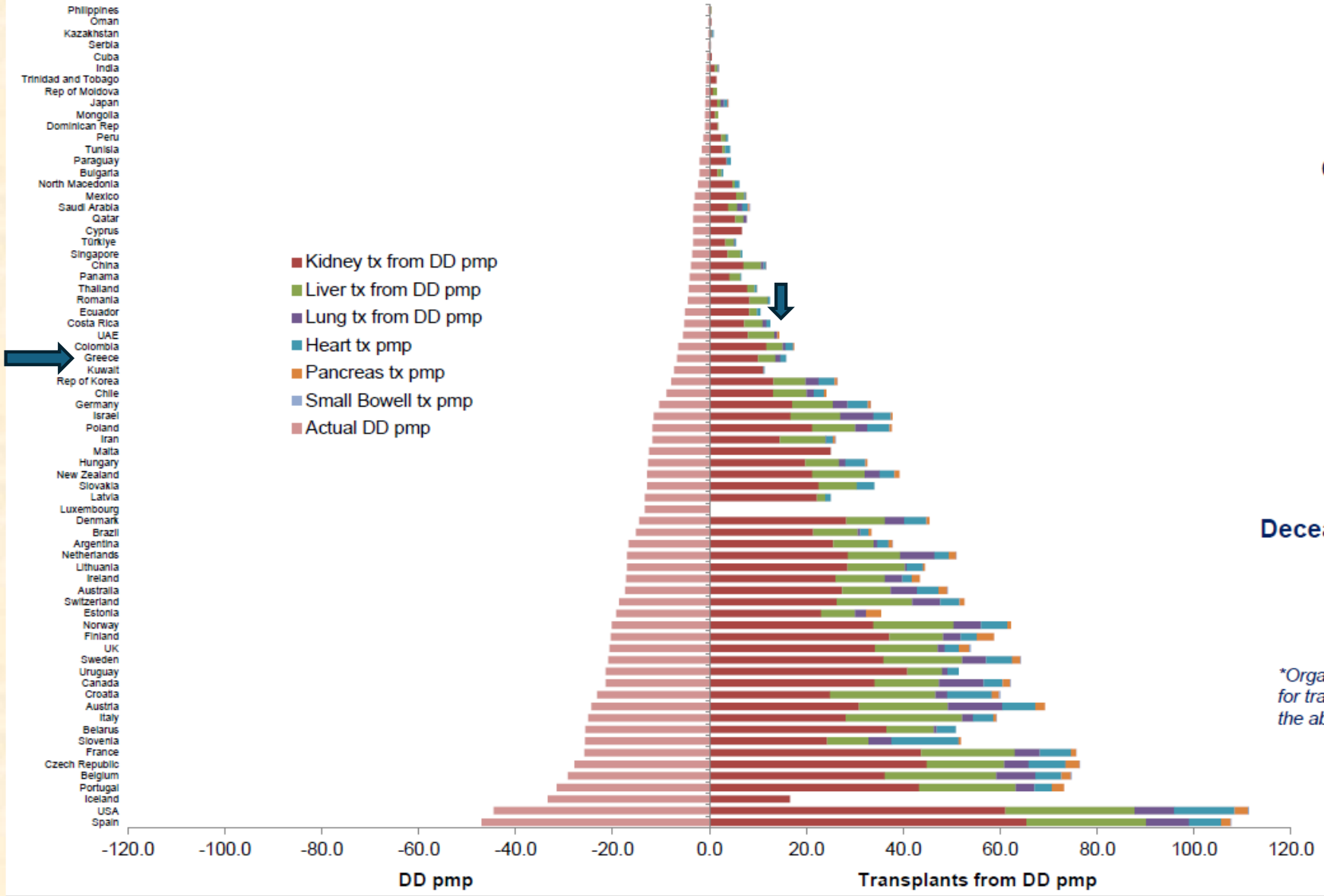


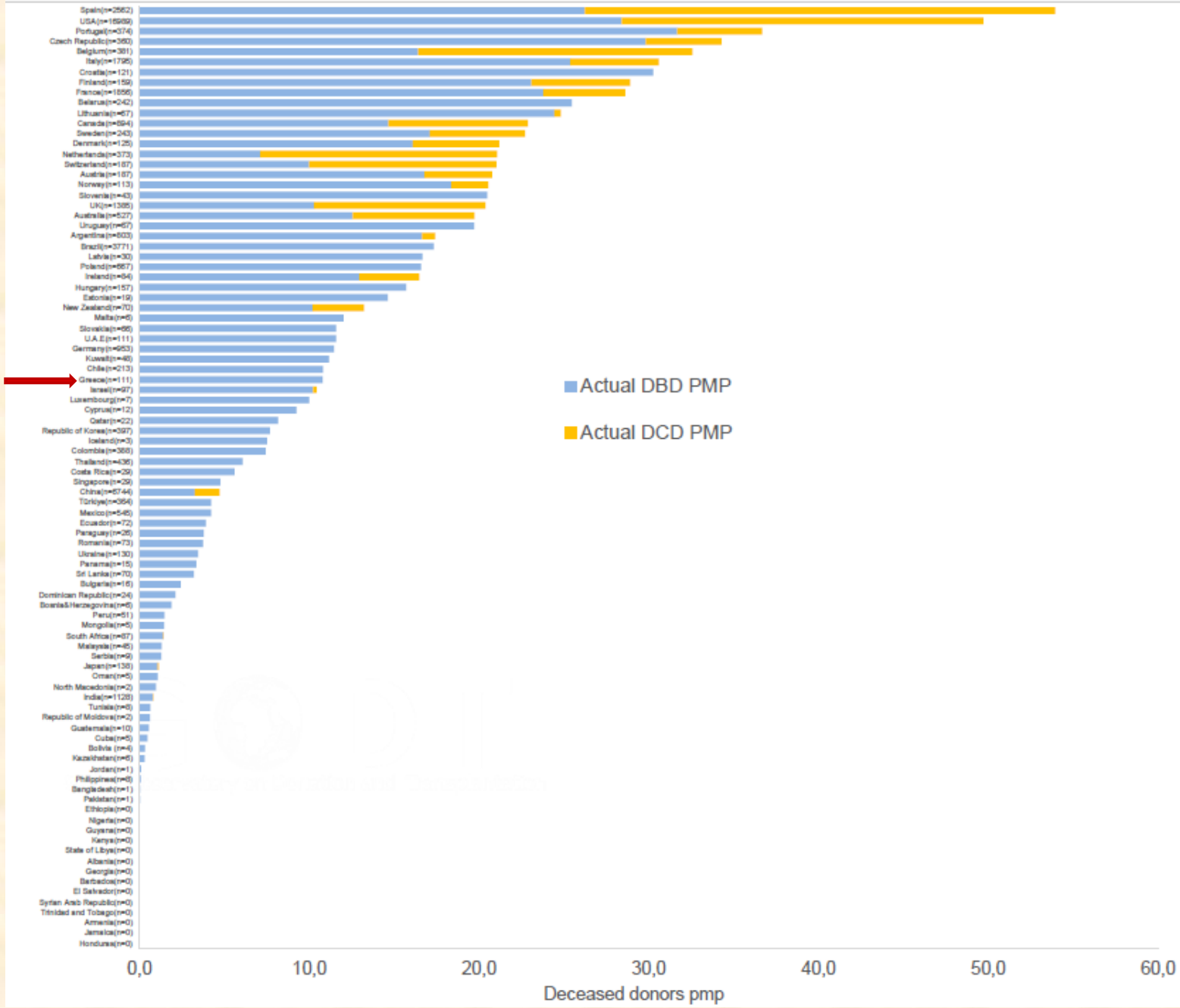
Actual deceased organ donors and transplants from deceased donors by type of organ (pmp)

2022

Deceased donation activities reported in 71/91 countries

**Organs recovered from deceased donors may be used for transplantation in other jurisdictions, particularly in the absence of local transplant programs.*

Source: Global Observatory on Donation and Transplantation (http://www.transplant-observatory.org/)



ACTUAL DECEASED ORGAN DONORS BY DONOR TYPE (PMP) 2024

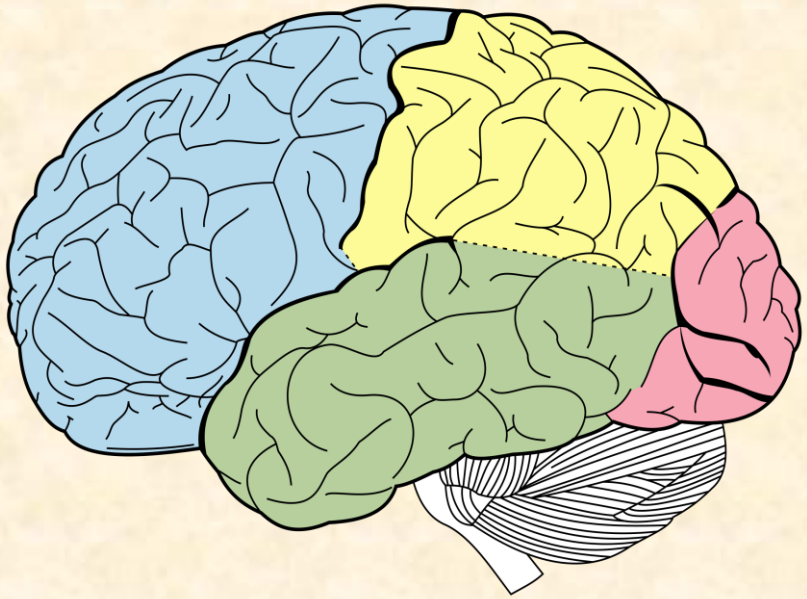
47 180 Deceased Donors
33 814 DBD (72%)
13 366 DCD (28%)

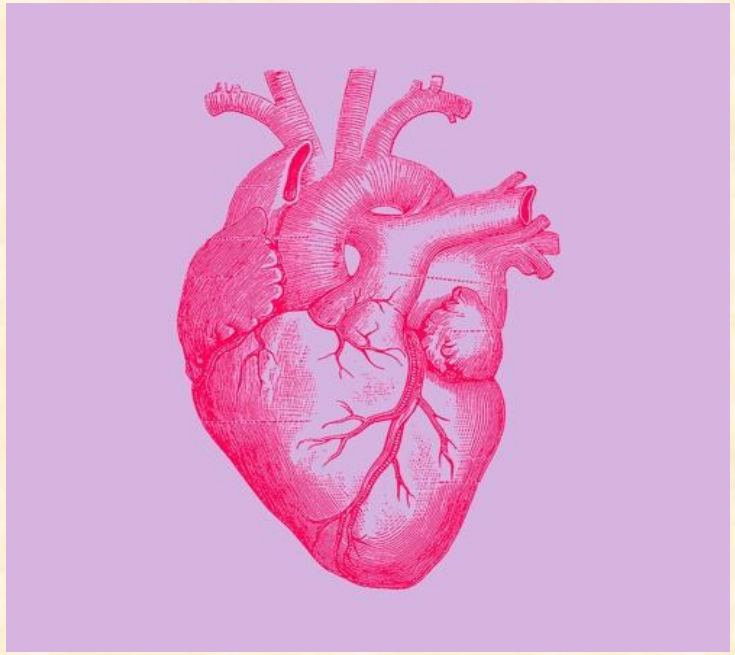
≈ 3 % increase *vs* 2023

Deceased donation activities reported in 78/92 countries

Actual donor: deceased person from whom at least one organ was recovered for the purpose of transplantation.

**Canada only provided utilized deceased organ donors*





Donation after Brain death
Donation after Circulatory death

DECEASED DONATION

Brain death- DBD
(neurological criteria)

Asistolia- DCD
(circulatory criteria)

Εγκεφαλικός θάνατος

- Εγκεφαλικός θάνατος είναι η κατάσταση της μη αναστρέψιμης βλάβης του εγκεφάλου, με απώλεια όλων των λειτουργιών του εγκεφαλικού στελέχους. Από το εγκεφαλικό στέλεχος εξαρτώνται οι βασικές λειτουργίες της ζωής ήτοι αναπνοή, κυκλοφορία και ικανότητα για συνείδηση. Η ανεπανόρθωτη βλάβη του εγκεφαλικού στελέχους ισοδυναμεί με τον εγκεφαλικό θάνατο και το θάνατο του ατόμου. Η διάγνωση γίνεται με βεβαιότητα και ασφάλεια με κλινικά κριτήρια.

(Απόφαση 9,της 21ης ολομέλειας του ΚΕ.Σ.Υ στις 20.3.1985)

Irreversible apnoeic unconsciousness

Circulatory death: permanent absence of respiration and circulation

Table 4. The Modified Maastricht Classification of DCD.

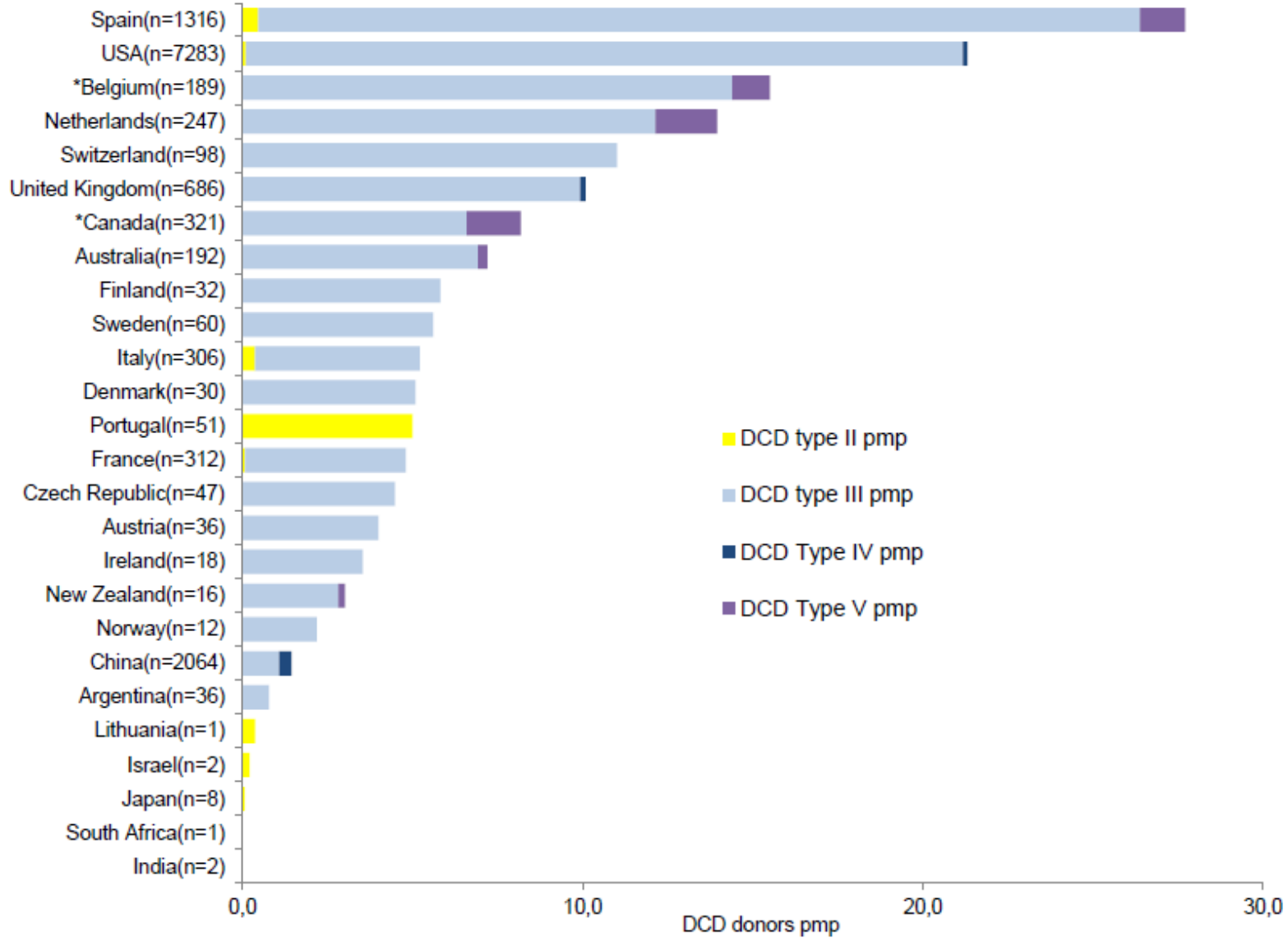
Category I. Uncontrolled	*Found dead* IA. Out-of-hospital IB. In-hospital	*Sudden unexpected CA without any* attempt of resuscitation by a life-medical team; *WIT to be considered according to National life-recommendations in place; reference to in- or out-of-hospital life-(IH-OH) setting*
Category II. Uncontrolled	*Witnessed cardiac arrest* IIA. Out-of- hospital IIB. In-hospital	Sudden unexpected irreversible CA with *unsuccessful resuscitation life-by a life-medical team*; reference to in- or out-of-hospital (IH-OH) life-setting
Category III. Controlled	*Withdrawal of life-sustaining therapy*	Planned withdrawal of life-sustaining therapy*; expected CA
Category IV. Uncontrolled Controlled	*Cardiac arrest while life-brain dead*	Sudden CA after brain death diagnosis during donor life-management but prior to planes organ recovery.

Maastricht classsification (1995)

I	II	III	IV	V
Dead at arrival.	Unsucessful I CPR	Pending CPR	CPR after BD diagnosis	Euthanasia
Emergency	Emergency ICU	ICU	ICU	Home/ Hospital

Circulatory death: permanent absence of respiration and circulation

Transplant International 2020; 33: 76–88



*Data on type III DCD donors not specifically reported, but inferred from other sources.
Belgium and Canada only provided data on utilized DCD donors

ACTUAL DCD DONORS BY MAASTRICHT TYPE (PMP) 2024

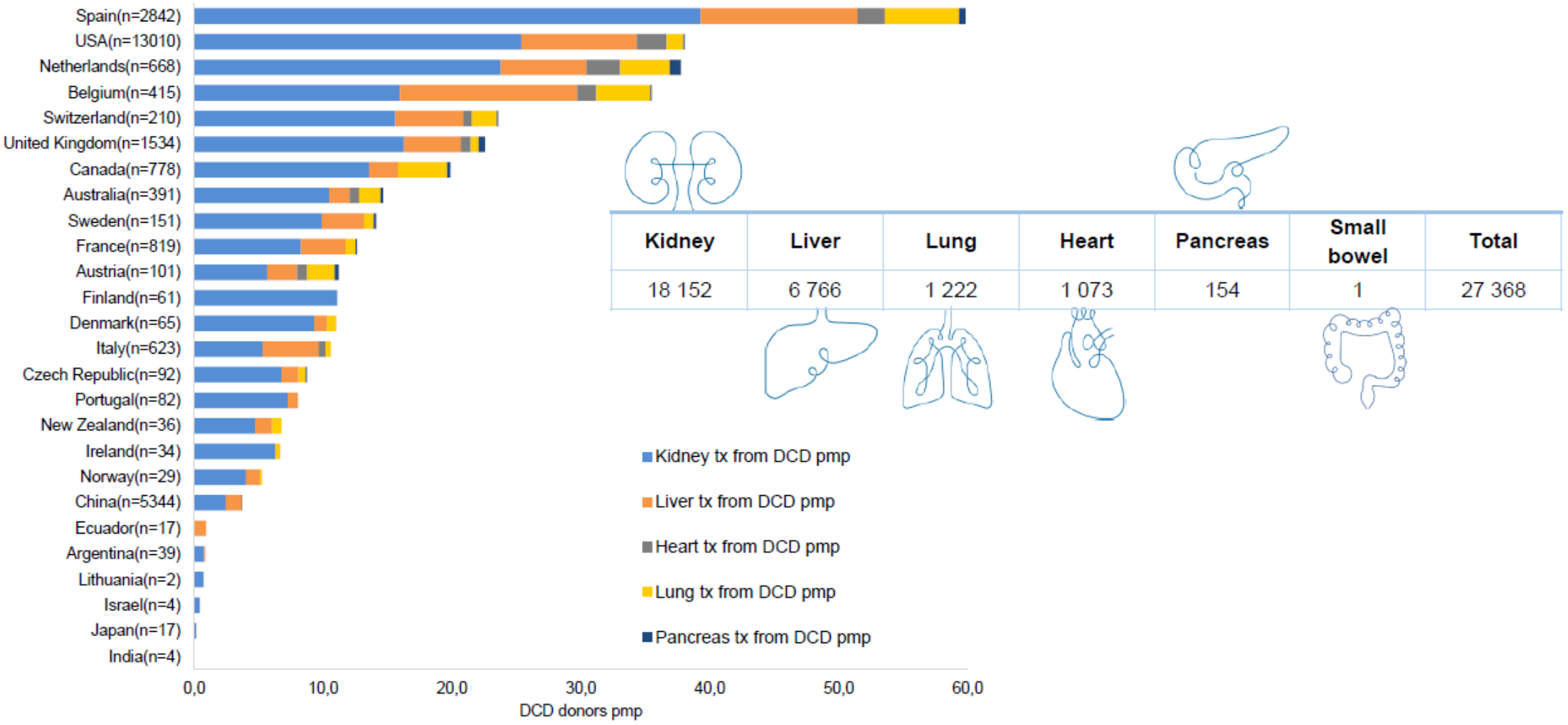
13 366 DCD donors
(28% deceased donors)

Type II: 148 (1%)
Type III: 12 485 (94%)
Type IV: 555 (4%)
Type V: 178 (1%)

DCD activities reported in 26/92 countries

Type II: Unexpected cardiac arrest, unsuccessfully resuscitated
Type III: Planned WLST with an expected cardiac arrest.
Type IV : Sudden or planned cardiac arrest after brain death.
Type V: Medical assistance in dying or euthanasia.

TRANSPLANTS FROM DCD DONORS BY ORGAN TYPE (PMP). YEAR 2024

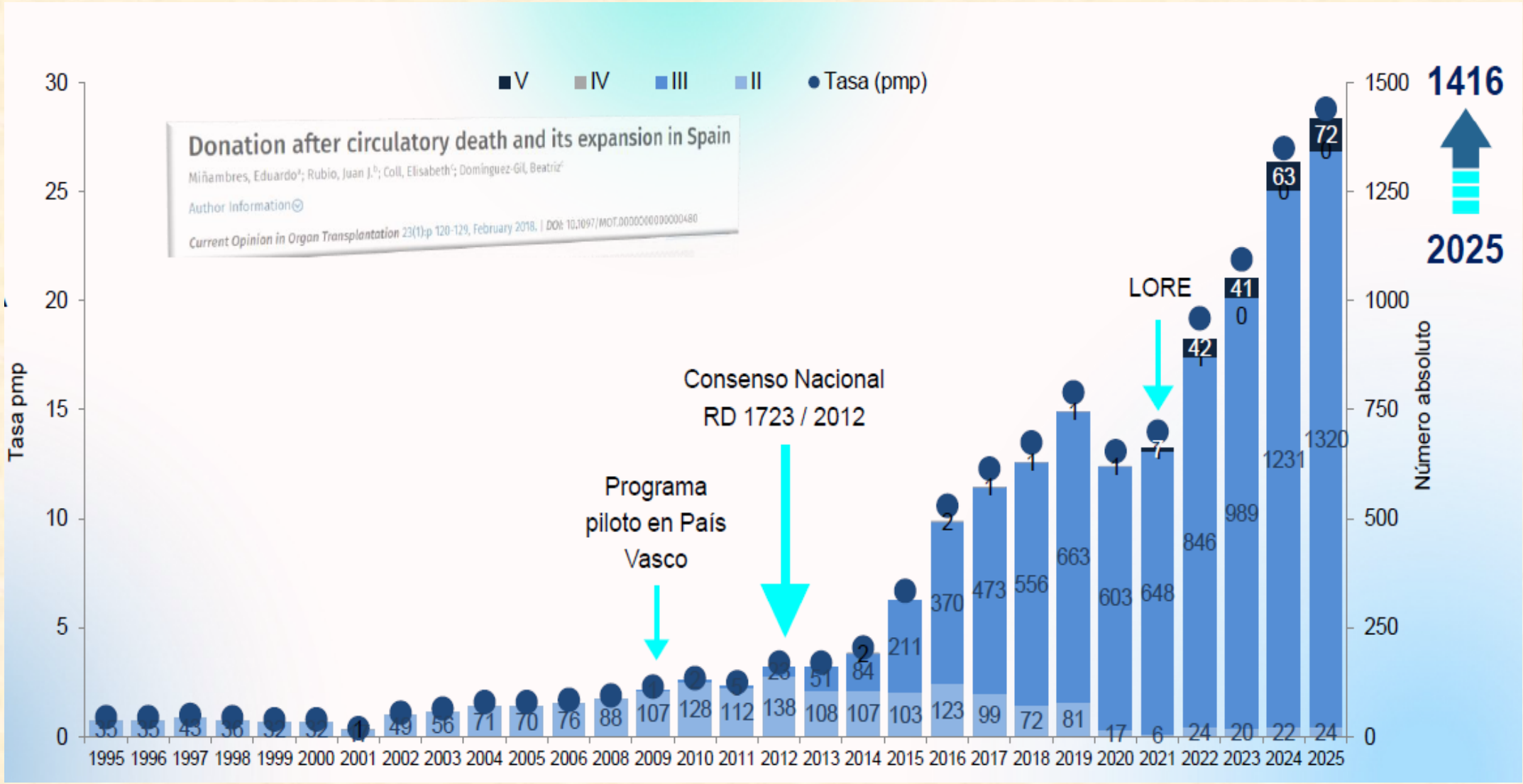


Kidney	Liver	Lung	Heart	Pancreas	Small bowel	Total
18 152	6 766	1 222	1 073	154	1	27 368

Source: Global Observatory on Donation and Transplantation (http://www.transplant-observatory.org/)

DONATION AFTER CIRCULATORY DEATH IN SPAIN

DCD REPRESENTS 45% OF DECEASED DONATION ACTIVITIES IN SPAIN



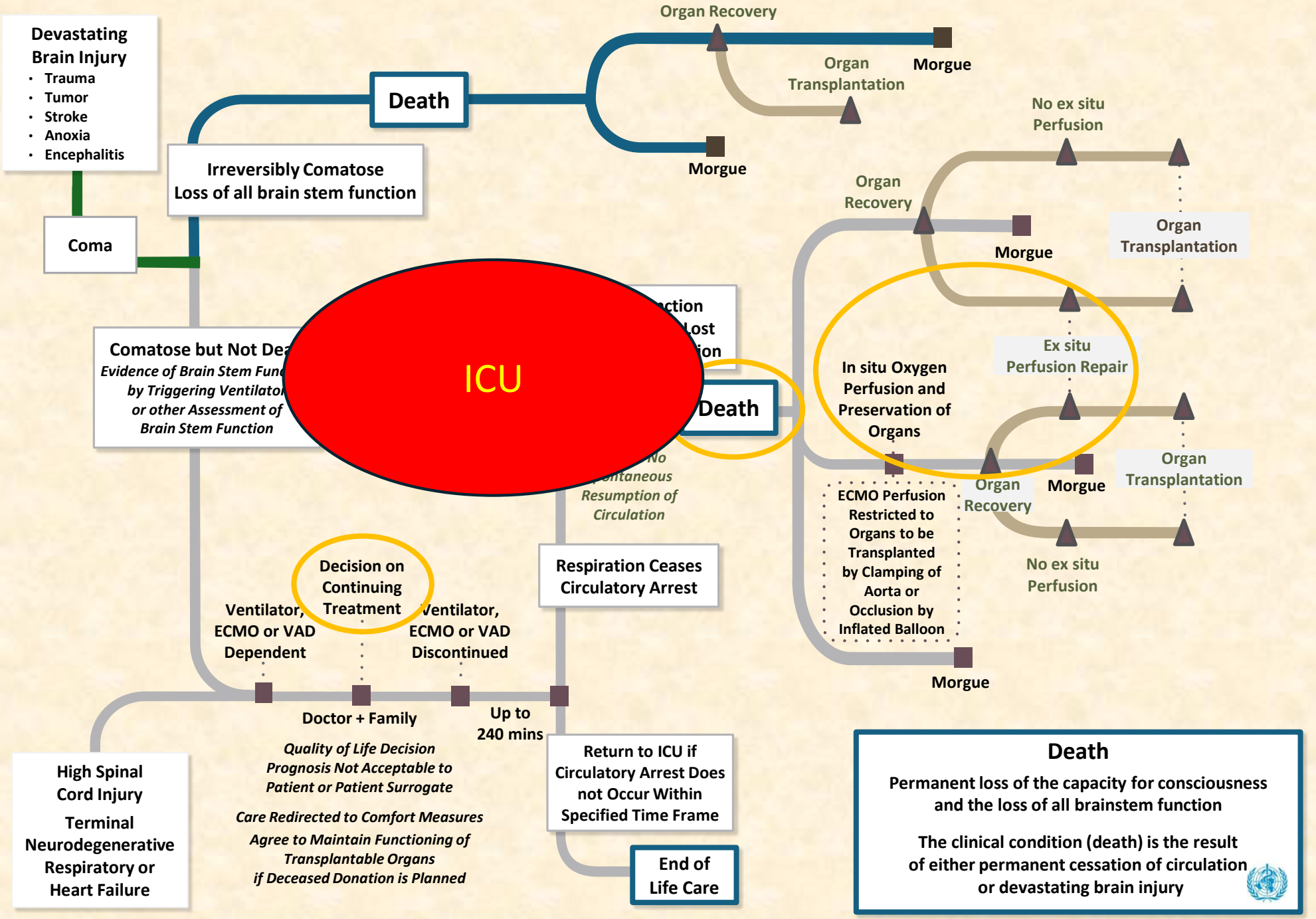
Source: Organización Nacional de Trasplantes

CHALLENGES **CDCD**

- **WHO ARE POTENTIAL DCD DONORS?**
- **HOW SHOULD BE DEATH BE DECLARED?**
- **WHAT ABOUT AUTORESUCITATION?**
- **IS DCD EFECTIVE & EFFICIENT?**

1. WHO ARE OUR POTENTIAL DCD DONORS?

Statement from an International Collaborative for Expanding Controlled Donation after the Circulatory Determination of Death 2020



Domínguez-Gil B, et al. Intensive Care Med 2021;47(3):265-281. doi: 10.1007/s00134-020-06341-7

DCDD PROVIDES THE OPPORTUNITY TO DONATE TO PATIENTS OTHER THAN THOSE WITH A DEVASTATING BRAIN INJURY

DCDD

+DBD

Devastating brain injuries

- Emergency care
- Neurology
- Neurosurgery
- Internal medicine
- Oncology, neurology, palliative care (CNS neoplasia)

Respiratory diseases

- Emergency care
- Pneumology
- Internal medicine

Heart diseases

- Emergency care
- Cardiology
- Coronary unit
- Internal medicine

Neurodegenerative diseases

- Neurology
- Pneumology
- Palliative care
- ALS units

2013-2023

220 actual donors with ALS (574 transplants) in Spain through DCDD protocols

http://www.ont.es/infesp/Paginas/DocumentosdeConsenso.aspx

DONACIÓN DE ÓRGANOS TRAS EUTANASIA EN ESPAÑA

2021-2025


347


136

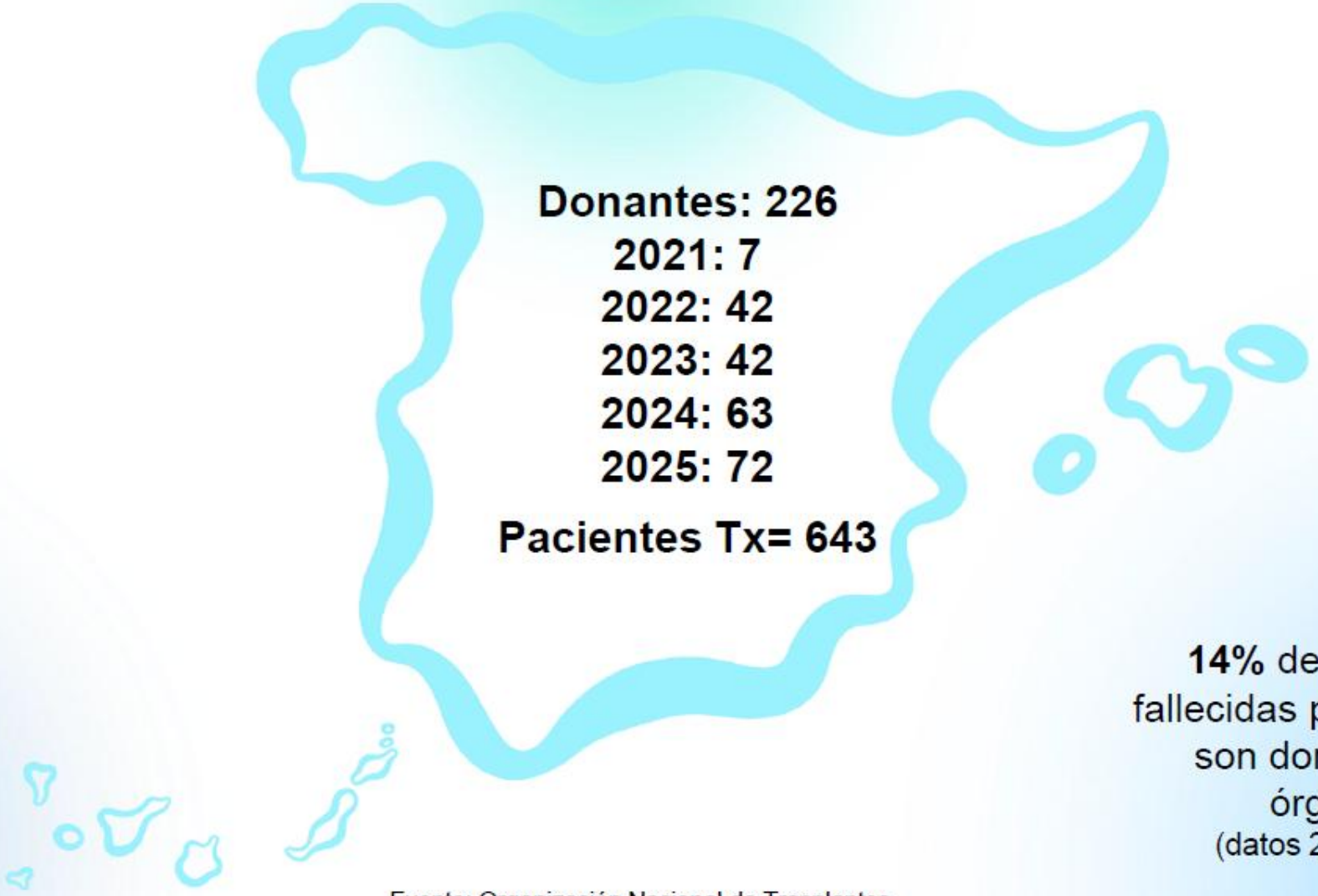

107


32


15


5


1



Donantes: 226
2021: 7
2022: 42
2023: 42
2024: 63
2025: 72

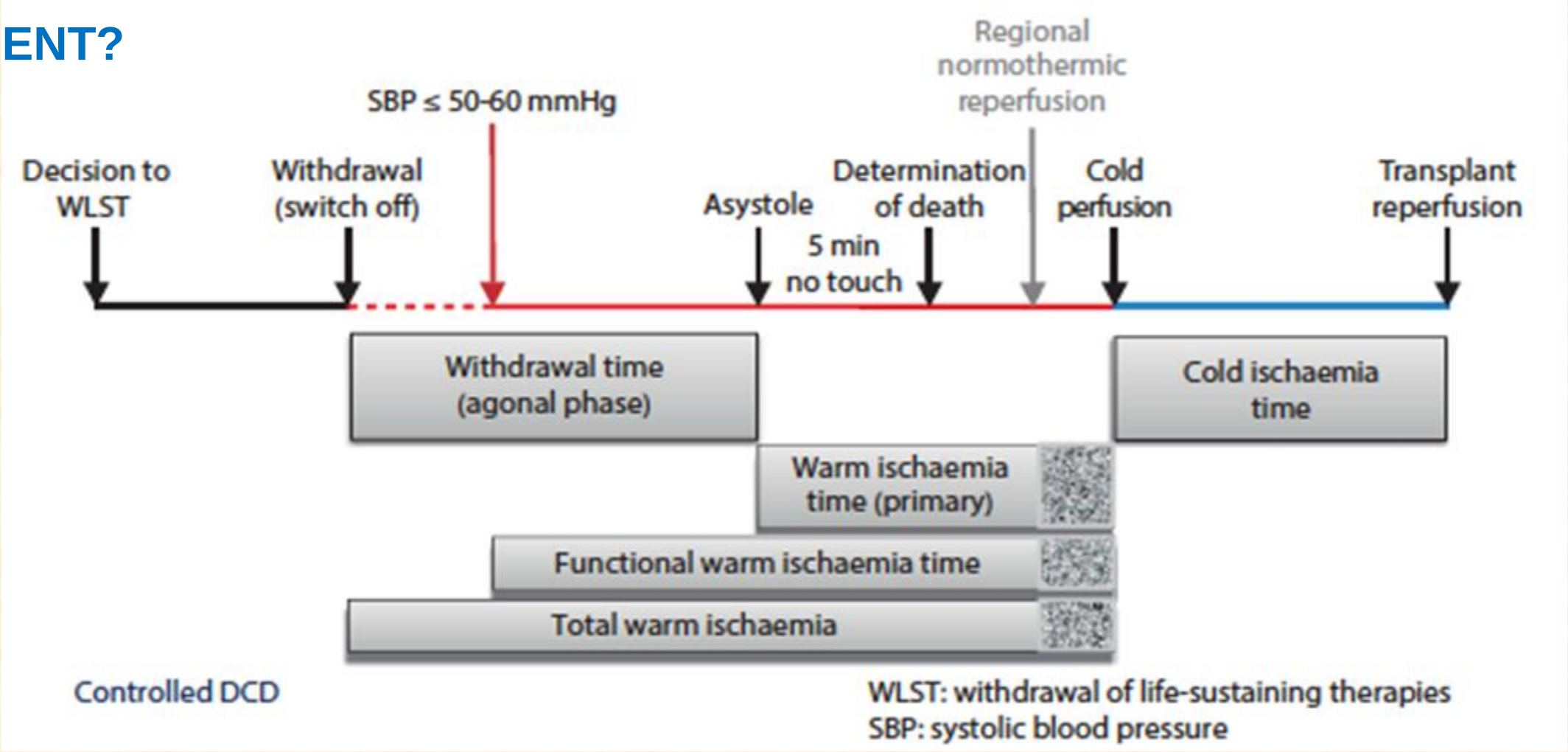
Pacientes Tx= 643

14% de personas fallecidas por eutanasia son donantes de órganos
(datos 2021-2024)

Fuente: Organización Nacional de Trasplantes

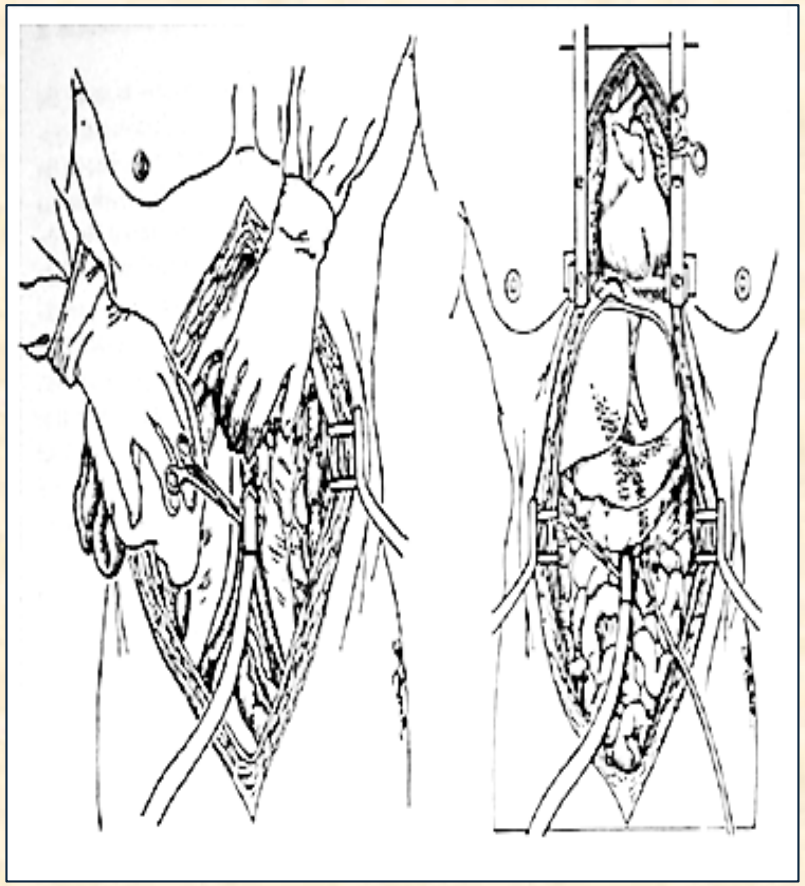
3. IS DCD EFECTIVE AND EFFICIENT?

WARM ISCHEMIA TIMES

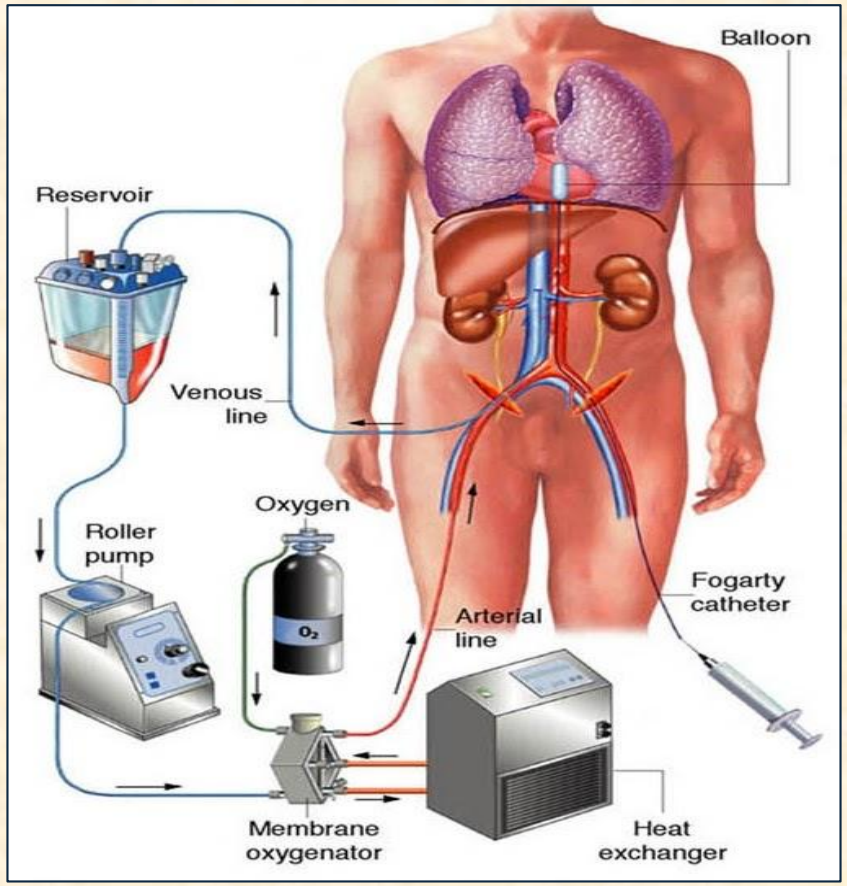


IN-SITU PRESERVATION TECHNIQUES

SUPER RAPID PROCUREMET



A- NRP



TA- NRP

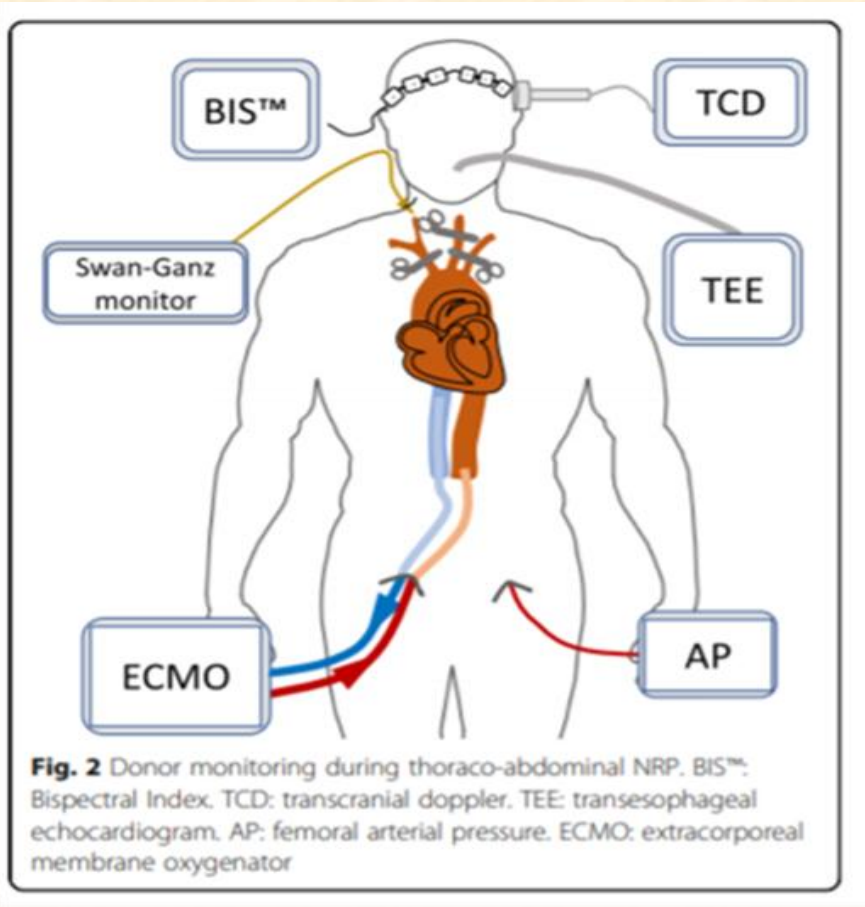
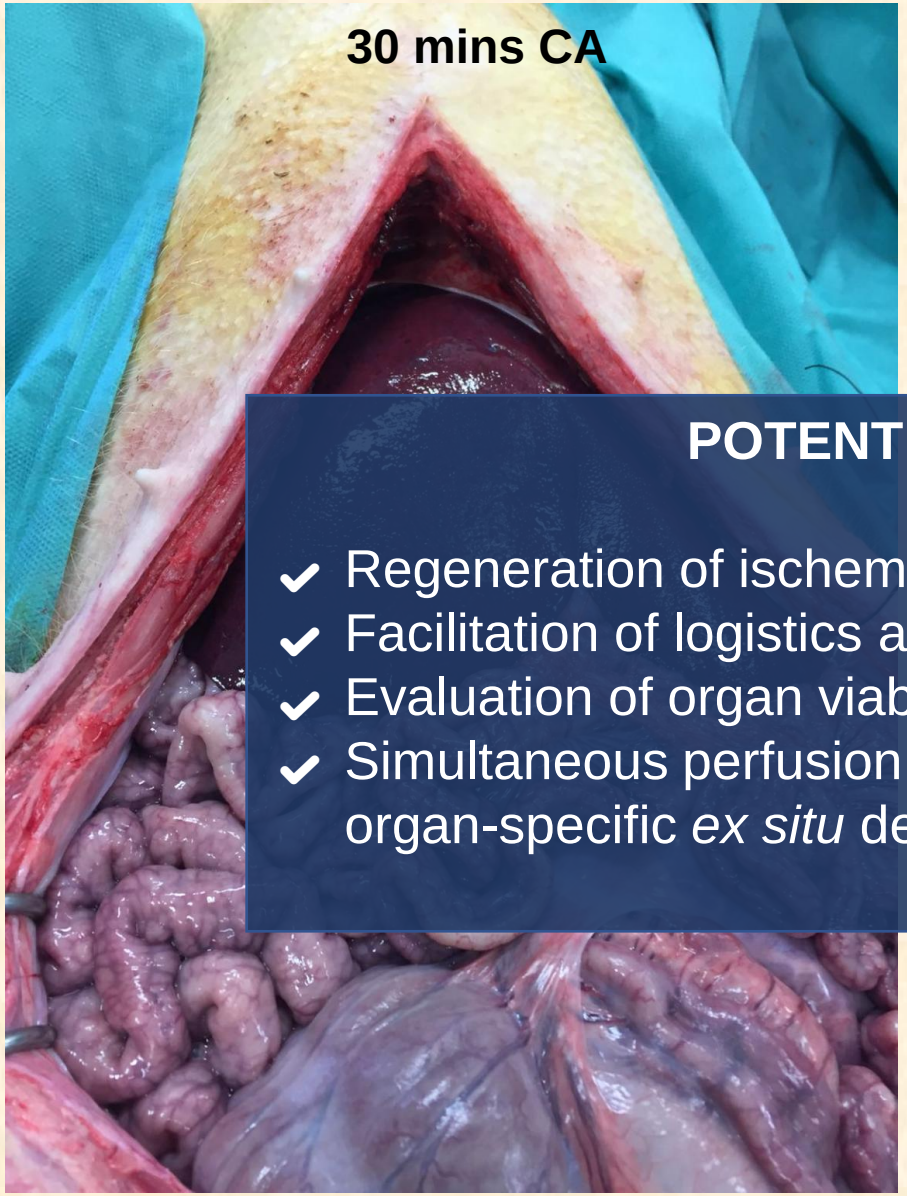
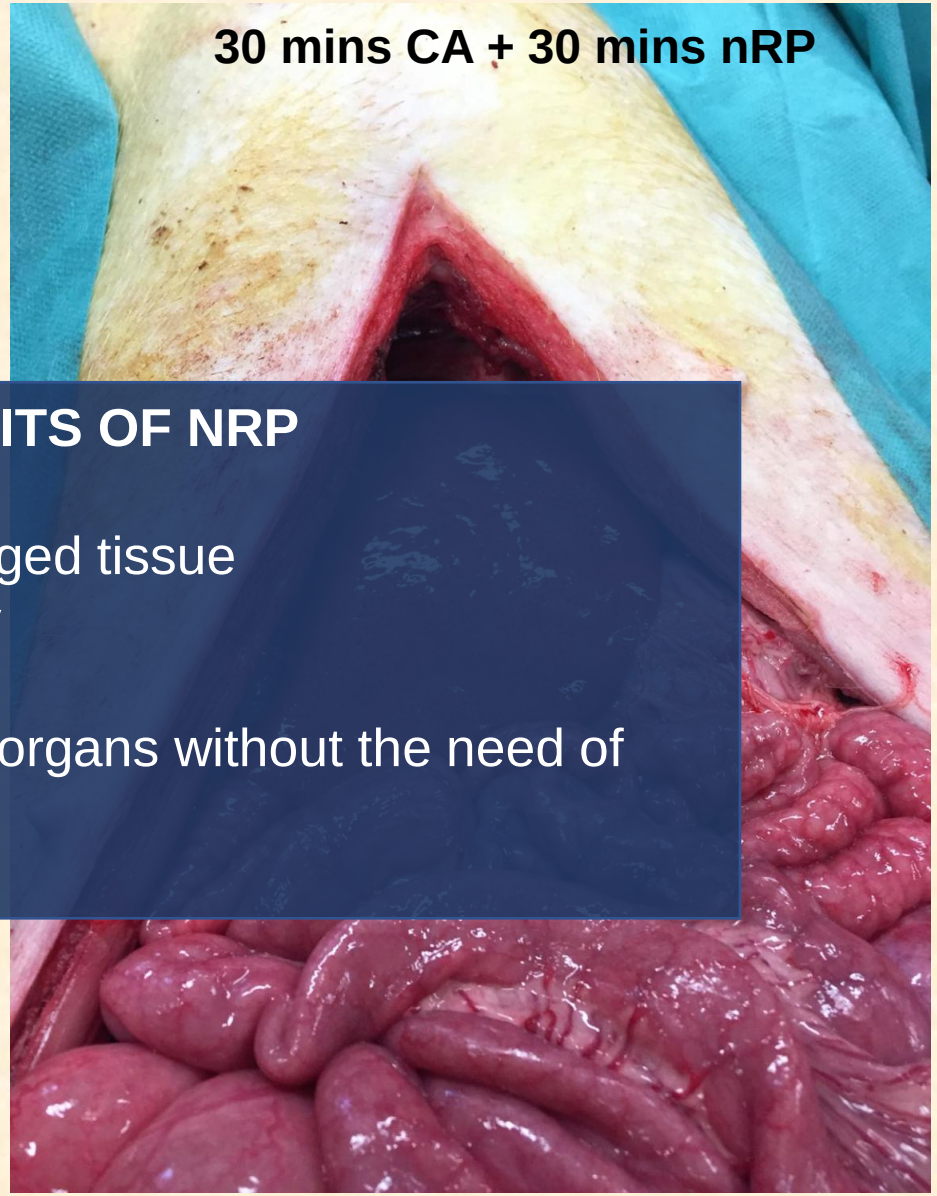


Fig. 2 Donor monitoring during thoraco-abdominal NRP. BIS™: Bispectral Index. TCD: transcranial doppler. TEE: transesophageal echocardiogram. AP: femoral arterial pressure. ECMO: extracorporeal membrane oxygenator

Vall d'Hebron





POTENTIAL BENEFITS OF NRP

- ✔ Regeneration of ischemically-damaged tissue
- ✔ Facilitation of logistics and recovery
- ✔ Evaluation of organ viability
- ✔ Simultaneous perfusion of different organs without the need of organ-specific *ex situ* devices

Courtesy: Dr. Constantino Fondevila, Hospital Clinic, Barcelona, Spain

cDCDD HEART TRANSPLANTATION IN SPAIN

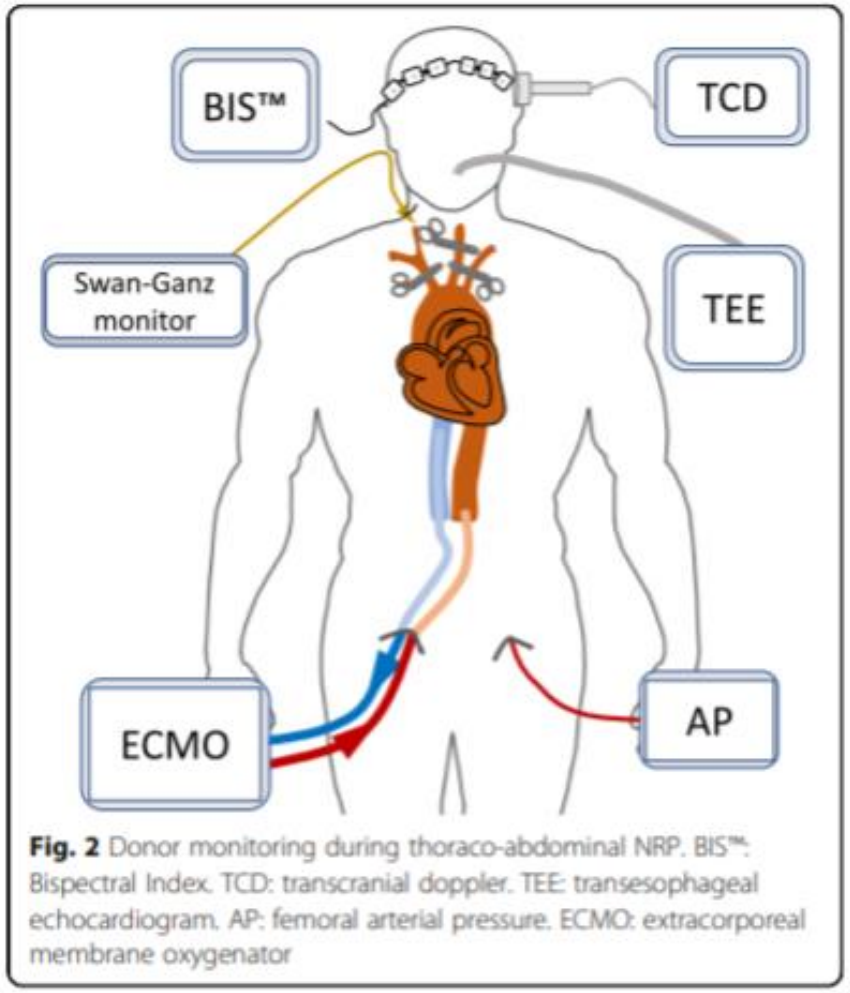


Fig. 2 Donor monitoring during thoraco-abdominal NRP. BIS™: Bispectral Index. TCD: transcranial doppler. TEE: transesophageal echocardiogram. AP: femoral arterial pressure. ECMO: extracorporeal membrane oxygenator

American Journal of Transplantation
AST AMERICAN SOCIETY OF TRANSPLANTATION ASTS

BRIEF COMMUNICATION

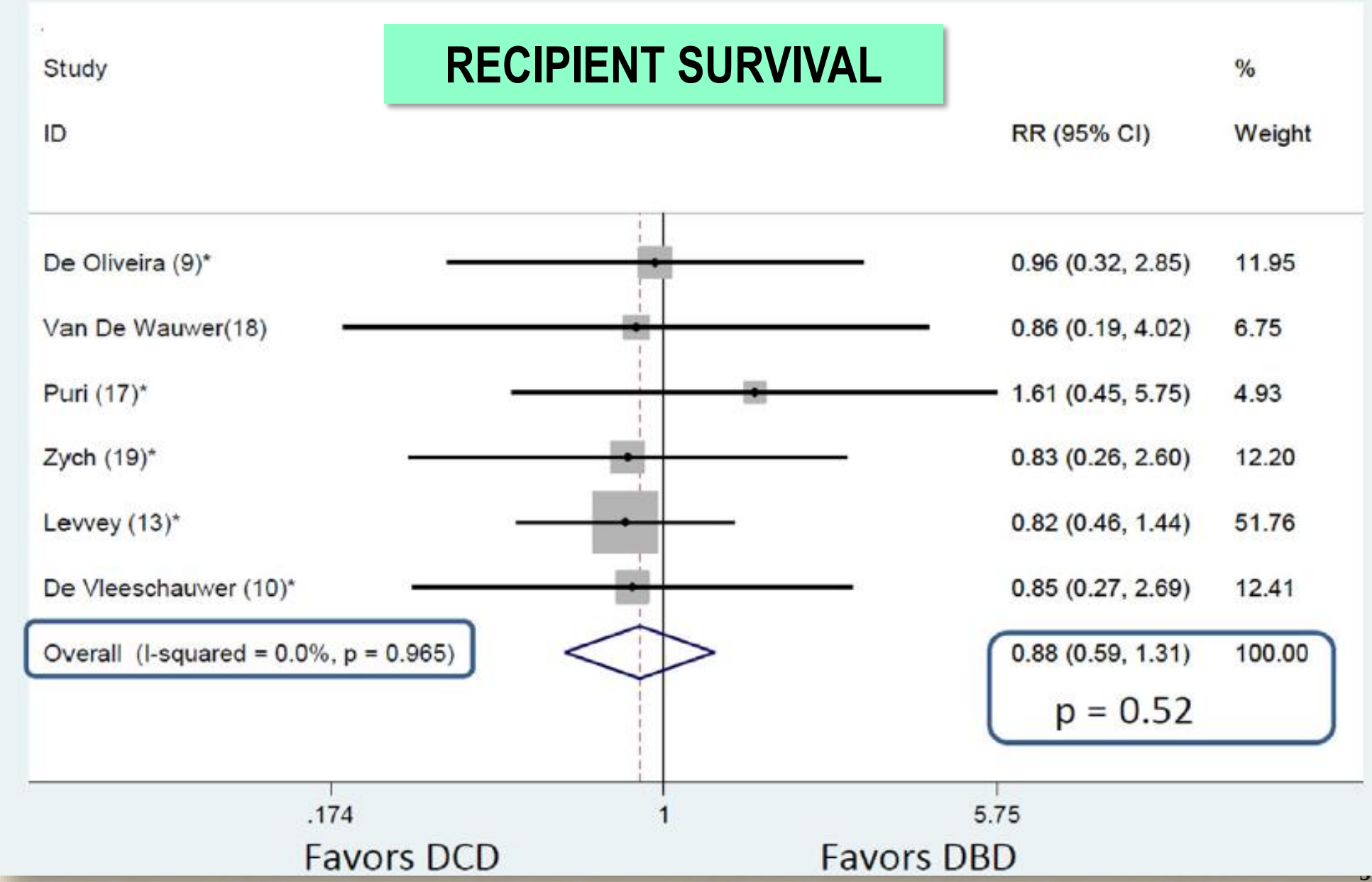
Spanish experience with heart transplants from controlled donation after the circulatory determination of death using thoraco-abdominal normothermic regional perfusion and cold storage

Eduardo Miñambres, Mario Royo-Villanova, Marina Pérez-Redondo, Elisabeth Coll, Susana Villar-García, Sergio J. Canovas, Juan Francisco Nistal, Iris P. Garrido, Manuel Gómez-Bueno, Manuel Cobo, Beatriz Dominguez-Gil ... See fewer authors

Miñambres E, et al. Am J Transplant 2021; 21(4):1597-1602. doi: 10.1111/ajt.16446

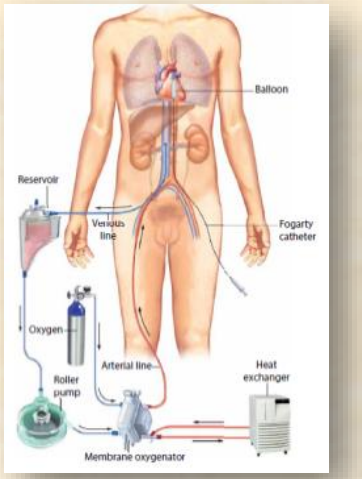
OUTCOME

RECIPIENT SURVIVAL



Krutsinger et al. J Heart Lung Trasplant 2015; 34(5): 675-84

cDCD KIDNEY TRANSPLANTATION. SPAIN 2012-2018

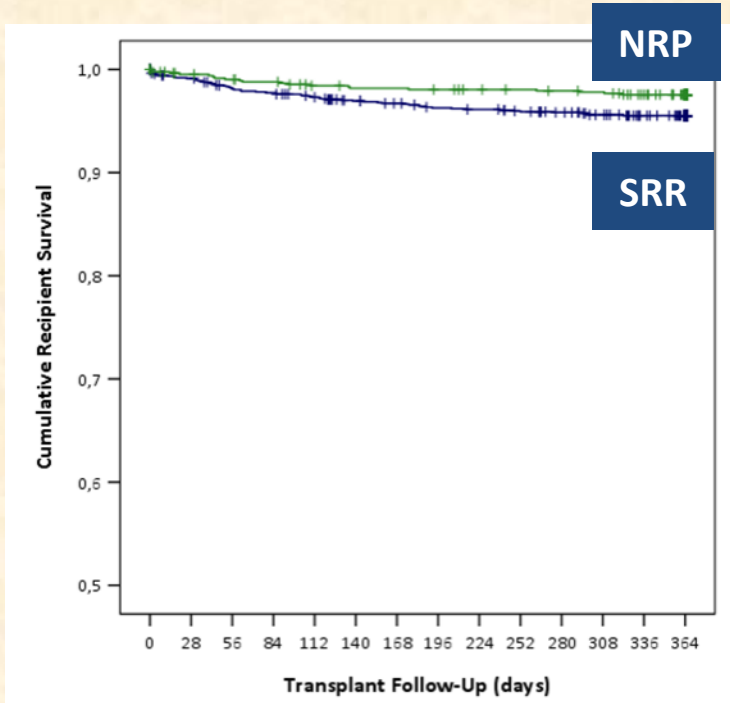


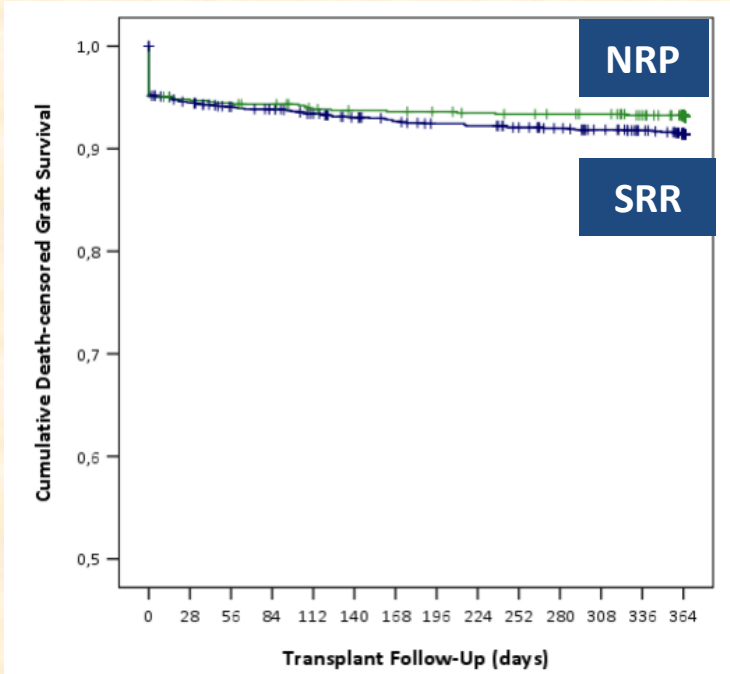
2,302 cDCD KIDNEY

TX 2012-2018:

NRP: 865 (38%)

RR: 1.437 (62%)





	UNIVARIATE				ADJUSTED				PSM				
	P	OR	CI95%		P	OR	CI95%		ATT (%)	P	OR	CI95%	
Primary non function	0.637	0.91	0.6	1.36	0.426	1.26	0.71	2.22	(6.6 vs. 4.7)	0.261	1.44	0.73	2.91
Delayed graft function	<0.001	2.16	1.79	2.6	<0.001	2.1	1.6	2.78	(45.4 vs. 29.7)	<0.001	1.97	1.43	2.72
		HR				HR					OR		
1-year graft loss	0.165	1.25	0.91	1.72	0.051	1.49	1	2.28	(9.9 vs. 5.8)	0.034	1.77	1.01	3.17
1-year patient death	0.017	1.85	1.12	3.07	0.055	1.83	0.99	3.46	(4.3 vs.2.3)	0.111	1.93	0.8	4.97

Padilla M, et al Am J Transplant. 2021 Nov;21(11):3618-3628. doi: 10.1111/ajt.16622.

NRP MUST ENSURE THE ABSENCE OF CIRCULATION TO THE BRAIN

4. WHAT ABOUT AUTORESUCITATION?

Expert Insight

Understanding the Brain-based Determination of Death When Organ Recovery Is Performed With DCDD In Situ Normothermic Regional Perfusion

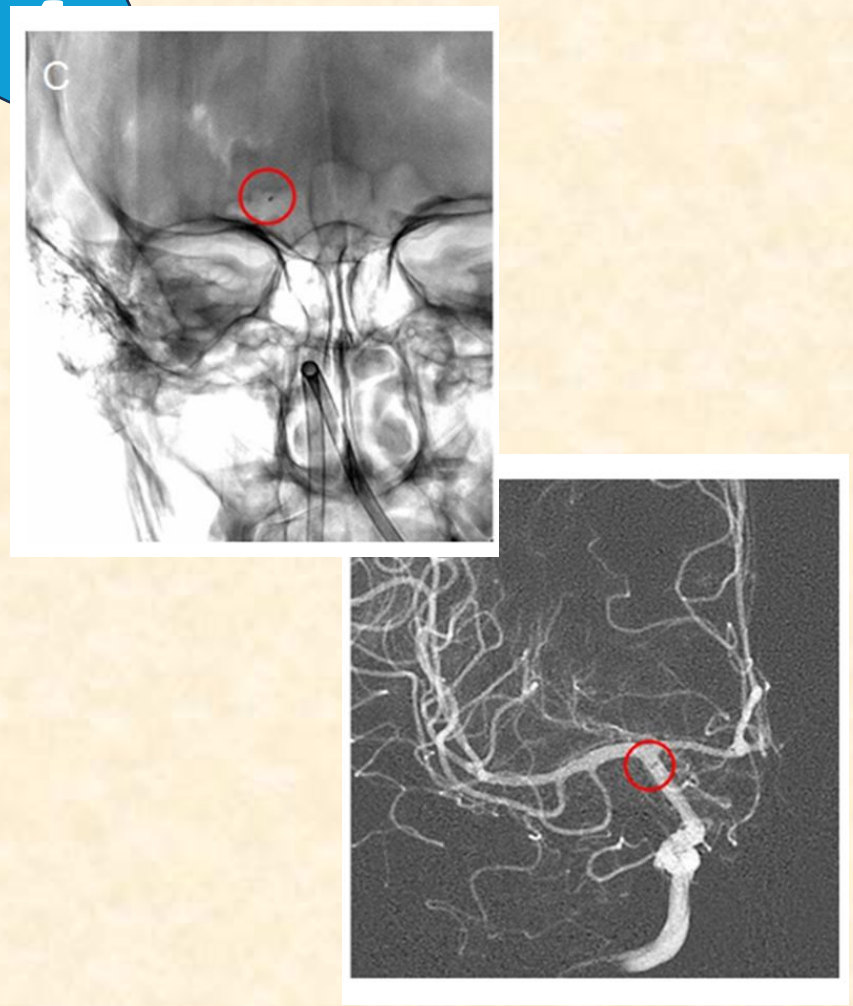
James L. Bernat, MD,[1] Beatriz Domínguez-Gil, MD, PhD,[2] Alexandra K. Glazier, JD, MPH,[3] Dale Gardiner, MBBS, MBioEth, FFICM,[4] Alexander R. Manara, Mb, BCh, FRCP, FRCA, FFICM,[5] Sam Shemie, MD,[6] Robert J. Porte, MD, PhD,[7] Dominique E. Martin, MBBS, BA(Hons), PhD,[8] Helen Opdam,[9] Andrew McGee, BA (Hons), LLB (Hons), LLM, PhD,[10] Marta López Fraga,[11] Michel Rayar, MD, PhD,[12] Thomas Kerforne, MD, PhD,[13] Mirela Bušić,[14] Renato Romagnoli, MD,[15] Marinella Zanierato, MD,[16] Stefan G. Tullius, MD, PhD,[17] Eduardo Miñambres, MD, PhD,[18] Mario Royo-Villanova, MD, PhD,[19] and Francis L. Delmonico, MD[20]

Protocols of DCDD Organ Recovery, Especially With In Situ Organ Preservation Using TA-NRP, Must Ensure the Permanent Absence of Circulation to the Brain

Current protocols in TA-NRP must be validated to provide assurance that the techniques to stop or divert collateral blood flow to the brain are experimentally proven and clinically effective. Programs using TA-NRP

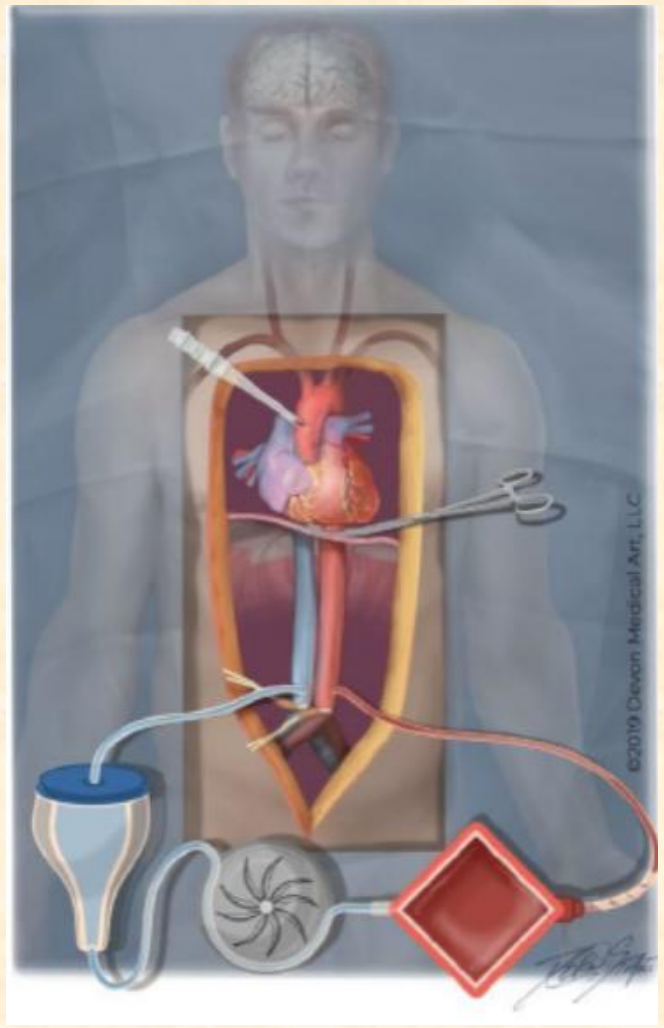
Bernat JL, et al. Transplantation 2023;107(8):1650-1654

AVOIDING REPERFUSION OF THE BRAIN DURING NRP

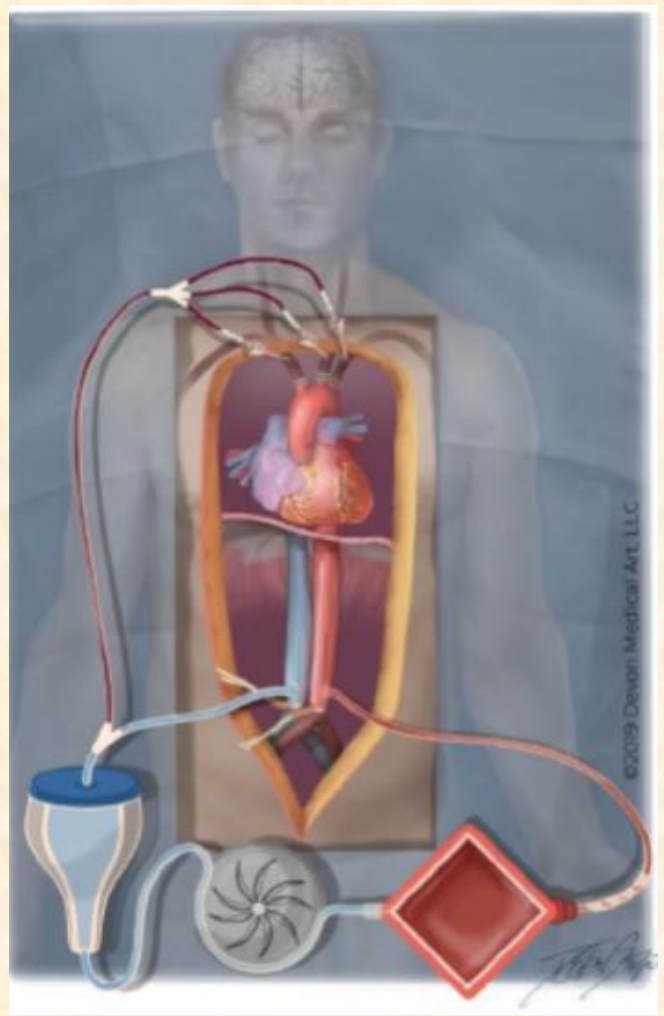


Royo-Villanova M, et al. Am J Transplant

A-NRP



TA-NRP



Manara M, et al. Am J Transplant 2020; 20 (8):2017-2025

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https://www.transplant-observatory.org/

http://www.transplant-observatory.org/

PROPOSED METHODS TO INCREASE DONATION RATES

'…Never blame the population. If people donate less, it must be something we have done wrong'.
Rafael Matesanz, Lancet. 2016

legislative changes

Donor registry

Mass media campaigns

WORK PARTIALY?

Donor card / donor ID

Other promotion methods

ROLE OF THE DONOR COORD

- ICU DAILY VISIT
- REMOTE NOTIFICATION
- REPORTING TRIGERS
- FEEDBACK ON DETECTION FAILURES

1. IDENTIFICATION

2. EVALUATION

- CLINICAL HX REVIEW
- TESTING
- CONSULTATION

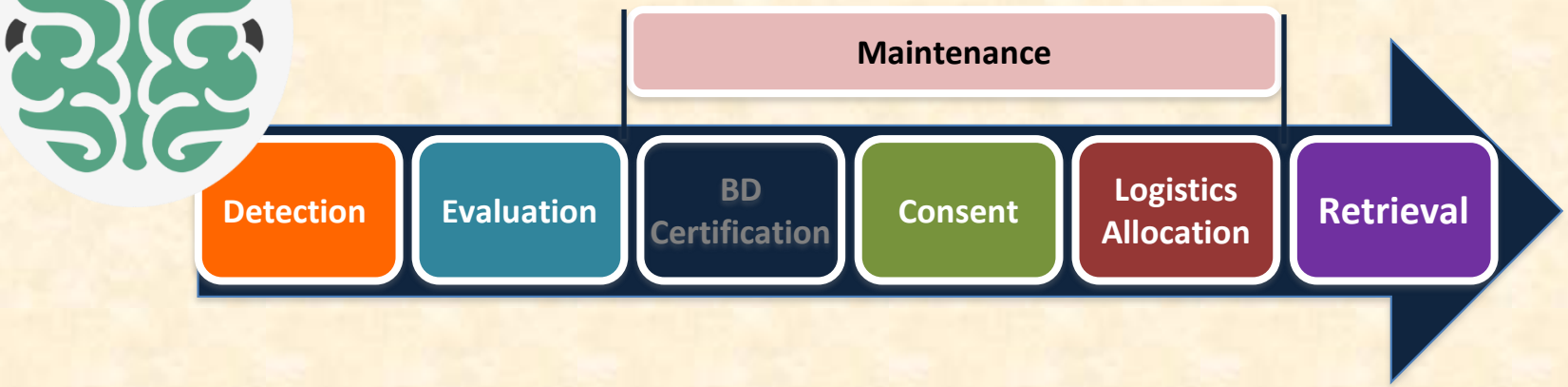
3. MANAGEMENT

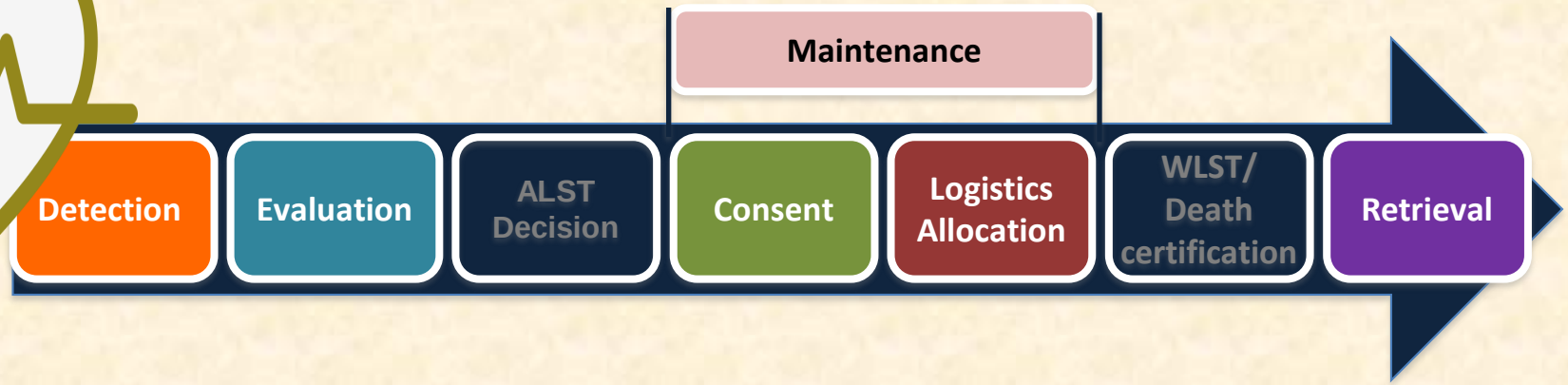
- LEGAL REQUIREMENTS
- AUTORIZATION (FAMILY/CORONER)
- ORGAN ALLOCATION
- LOGISTICS
- PROCUREMENT

4. FOLLOW UP /REGISTRY

- PROCESS SAFETY
- BIOVIGILANCE
- DOCUMENTATION

DECEASED DONATION PROCESS





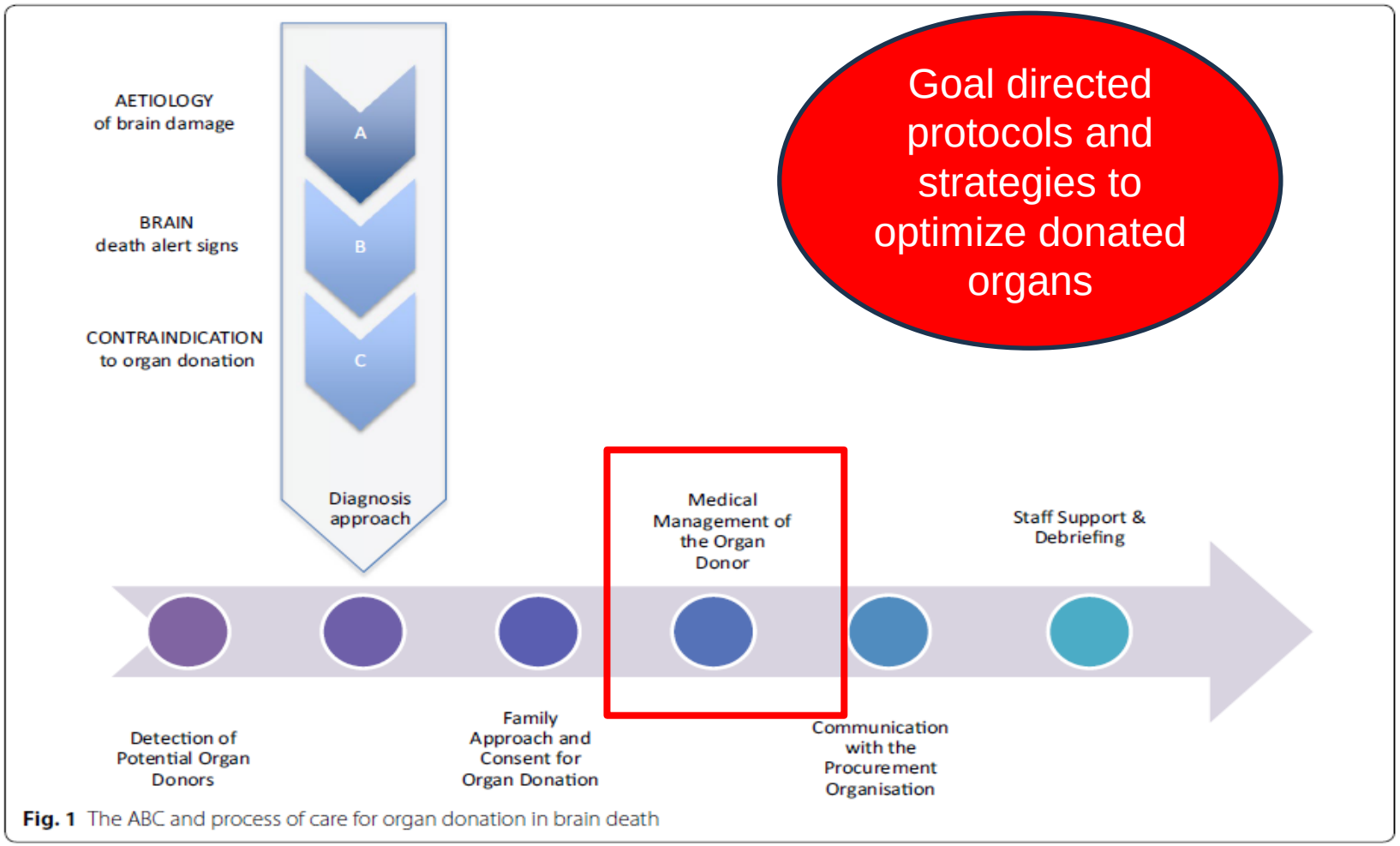


Fig. 1 The ABC and process of care for organ donation in brain death

I Martin Loaches et al. *Intensive Care Med* 2019

SEMICYUC RECOMMENDATIONS REGARDING DECEASED DONATION

5 RECOMENDACIONES DE INTERÉS ELEVADO de los Grupos de Trabajo de la SEMICYUC

GRUPO DE TRABAJO DE TRASPLANTES

01 Donation should be a routine **component of end-of-life care**

02 Consider the option of organ and tissue donation **in brain dead patients**

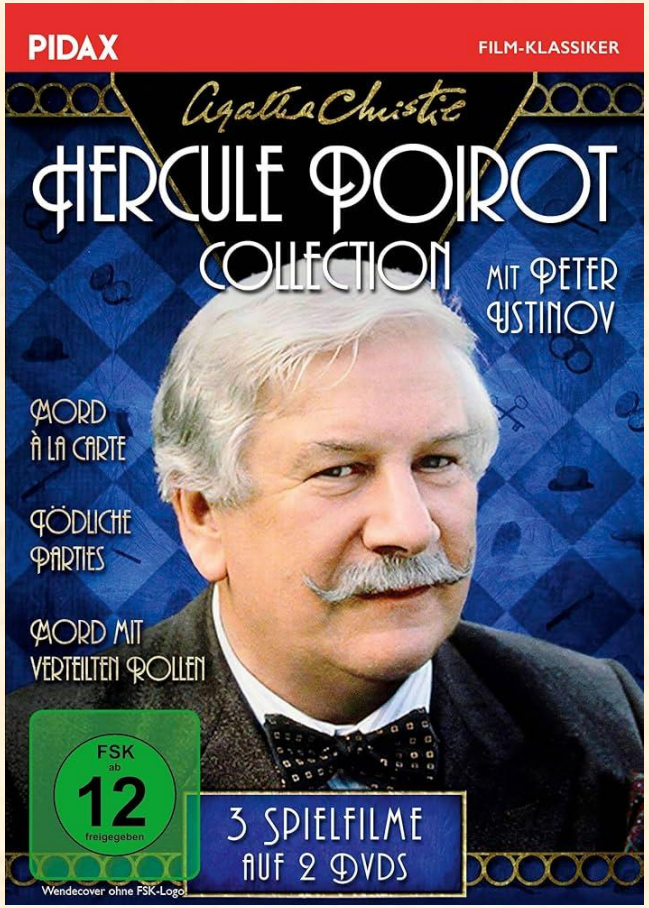
03 Consider the option of controlled DCD in patients **in whom the decision has been made to withdraw life-sustaining therapies**

04 Discuss organ donation with families of patients with a **devastating brain injury with no treatment options**, and offer the opportunity of admission into the ICU

05 When informing families of patients dead in the ICU, **offer the possibility of tissue donation**

Hernández-Tejedor A, et al. Med Intensiva 2017; 41(5): 285-305.

Έγκαιρος εντοπισμός αποβιώσαντα δότη ή πιθανού δότη: Το κομβικό και πρωταρχικό σημείο στη διαδικασία της δωρεάς



Identification and referral of possible donors

- Accord project: 35% of pts died by DBI never referred to the donor coordinator
- Failure to identify: a main reason of different donation rates between countries
- When death is inevitable and imminent: Active therapy → Palliative or end of life care
- Early referral: Assessment of medical suitability
  Expert assistance for BD testing
  Planning of the family approach

EDQM 8th Edition 2022

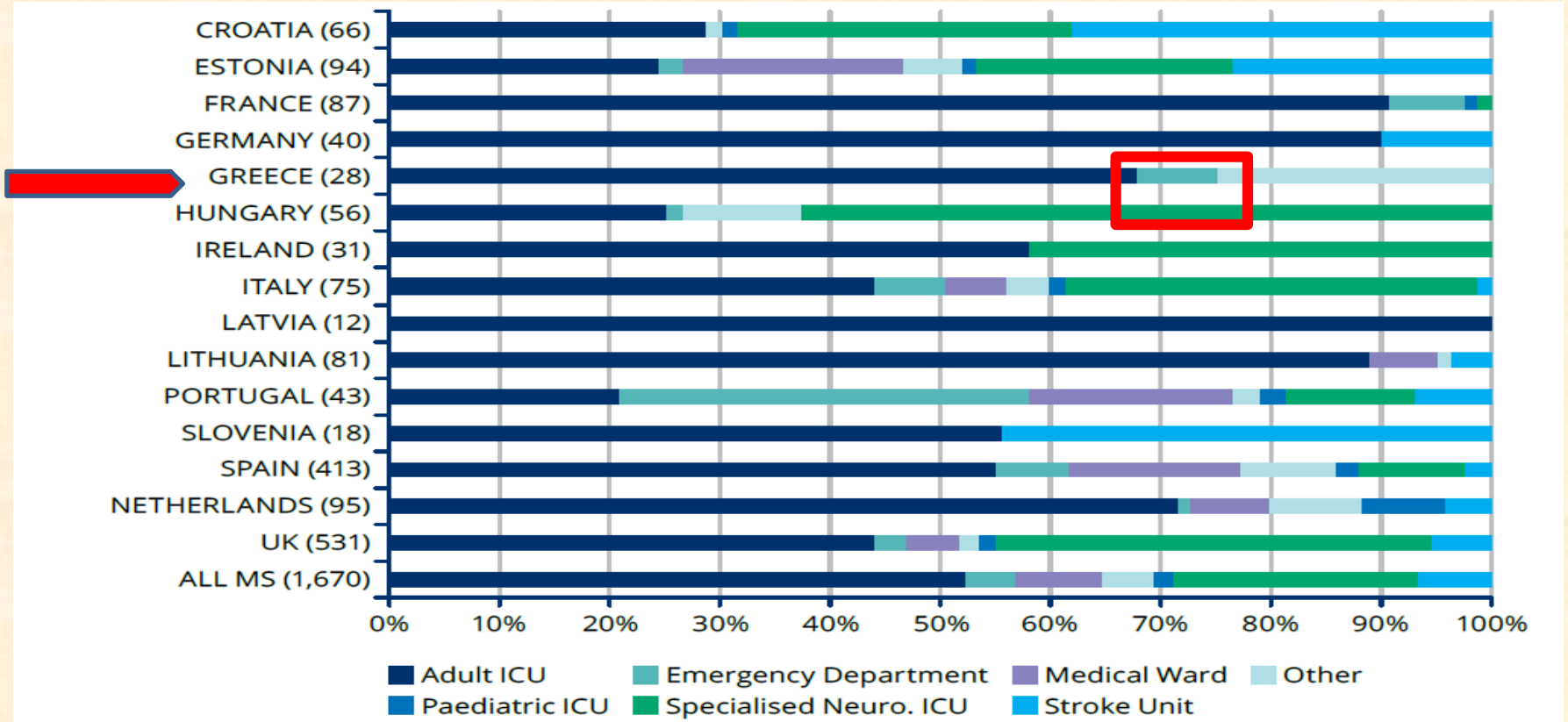


Figure 7: Clinical area where the patient was confirmed dead

ICU: The most common place of BD confirmation

Frequently missed donors from the ED: Lack of knowledge or incorrect assumptions

SPANISH QAP IN ORGAN DONATION 1999-2021

Potential DBD donors (PD*): 51,478 (11% deaths in the ICU)

→ **Failure to identify and refer: 2%**

→ **Medical unsuitability: 20%**

→ **Organ recovery does not proceed:**

- ✔ BD diagnosis not completed: <1%
- ✔ Maintenance problems: 2%
- ✔ Consent declined: 12%
- ✔ No legal authorization: <1%
- ✔ Logistical problems: <1%
- ✔ No suitable recipient: <1%

Actual DBD donors: 33,1274 (60% PD)

**Clinical condition consistent with brain death (medical contraindications included)*

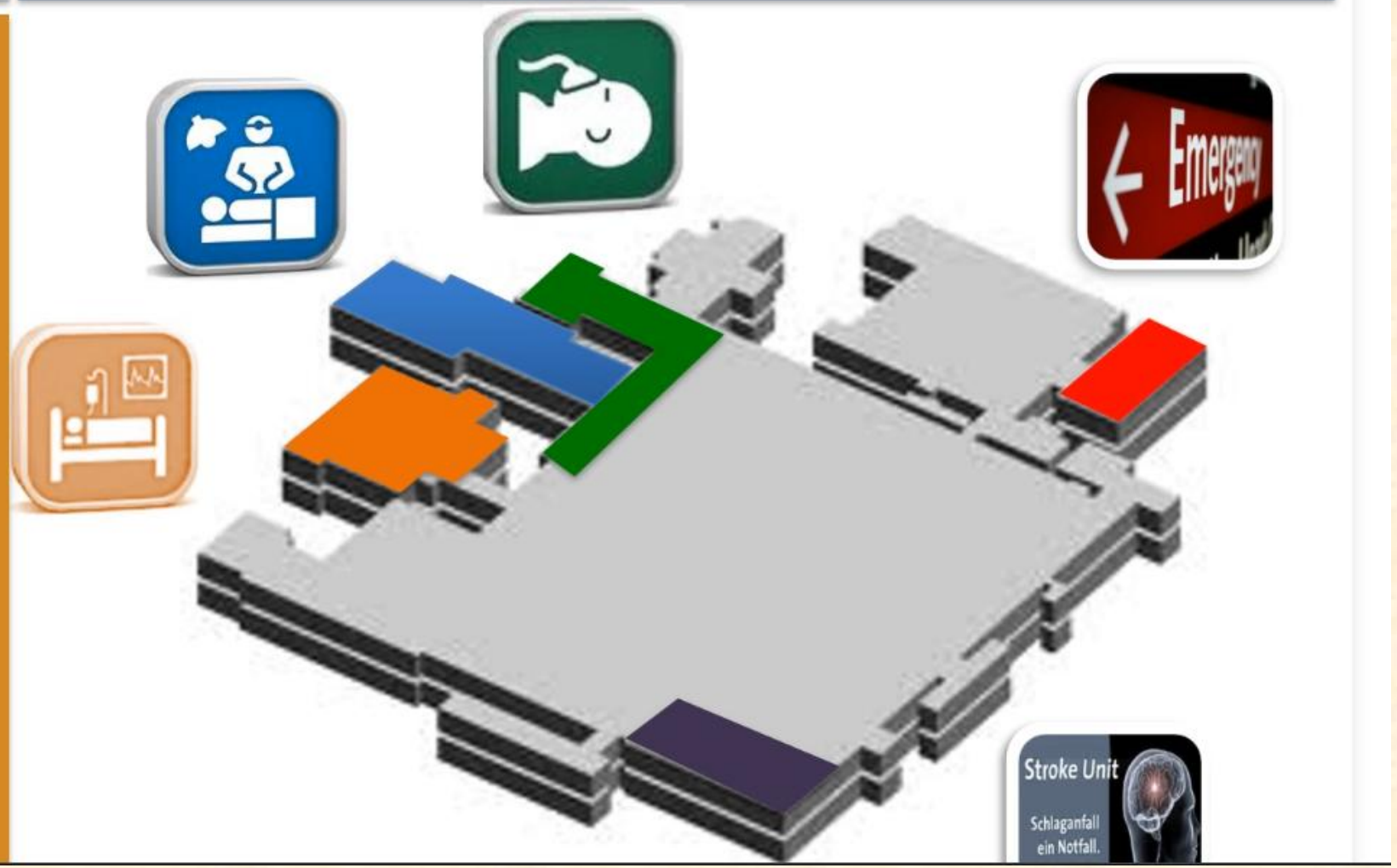
184 EXTERNAL AUDITS DURING THE SAME PERIOD Possible improvement~ 22% !

TPM

M-DT Foundation

Where are my donors?

BRAIN DEATH !



Clinical triggers for the identification of deceased organ donors

- Simple clear clinical criteria
- Referral regardless patient's age, comorbidities, cause of BD
- Zero missed opportunities

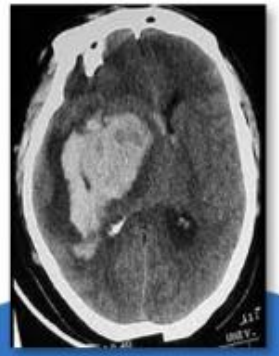
EDQM 8th Edition 2022

Possible donors

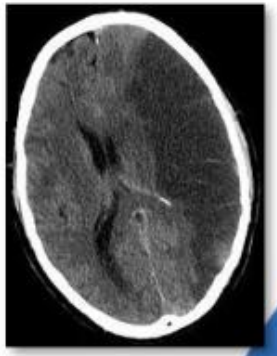
- GCS<8
- Cerebral hemorrhage: Hunt- Hess scale ≥4
- Non contrast computed tomography: Acute extravasation of blood –Independent predictor of early hematoma expansion
- ICD-10

BRAIN DEATH !

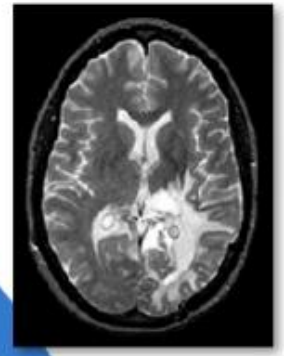
HEMORRHAGIC STROKE



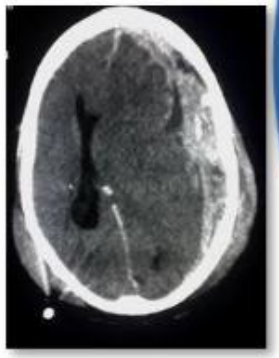
ISCHEMIC STROKE



BRAIN TUMOUR



HEAD TRAUMA



ANOXIC ENCEPHALOPATY

GCS<8

Brain death

Play

07:21

Extended criteria donors

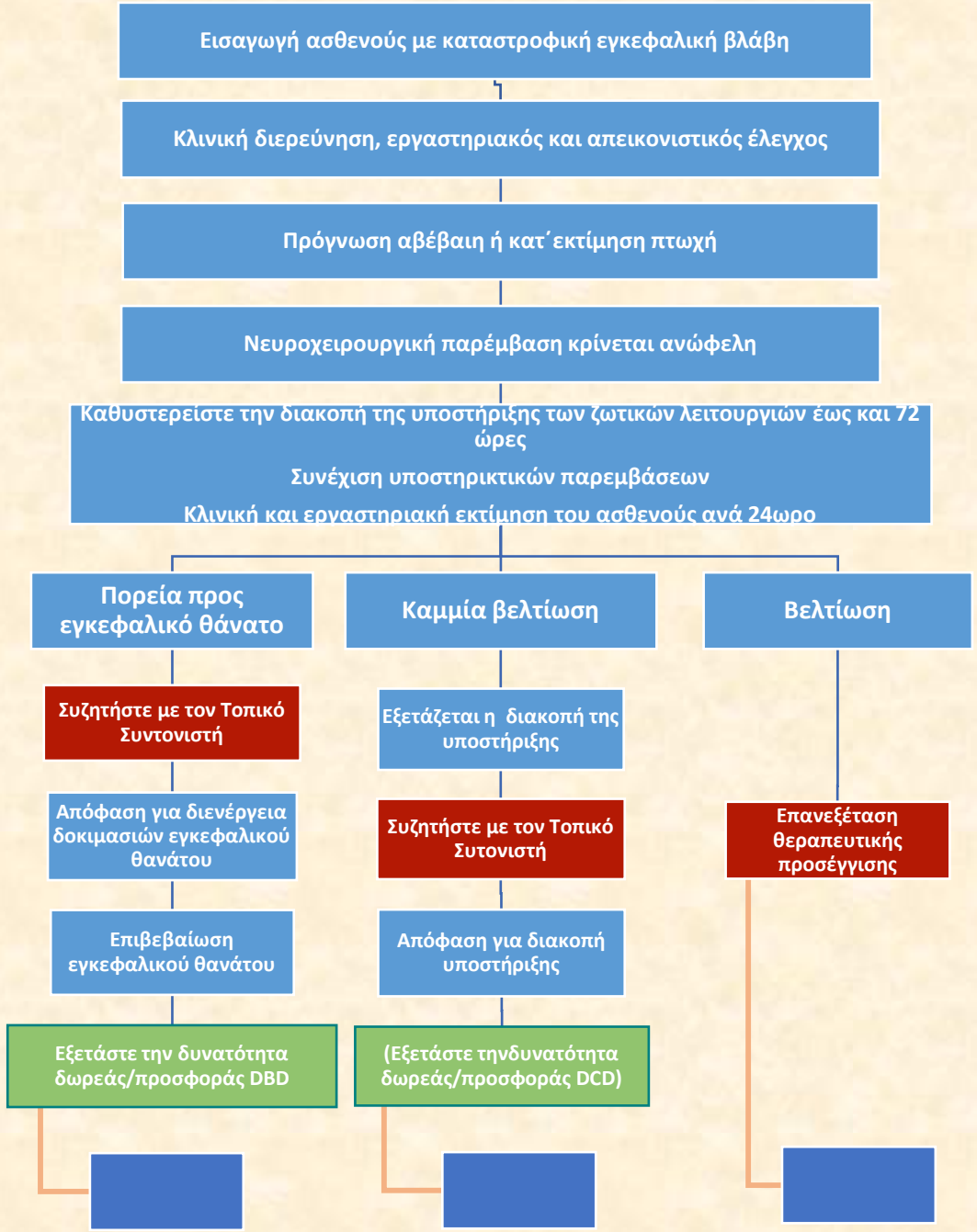
- Preexisting comorbid factors: age, DM, alcohol abuse, smoking, medication, organ disease
- Acute organ damage due to an acute event (trauma, PE, hypoxemia)
- Insufficient therapy before or after brain death (DI, hypovolemia, electrolyte disorders, hypotension)

ICD-10 νόσων που θα μπορούσαν να εξελιχθούν σε εγκεφαλικό θάνατο

- S02.0 Κατάγματα κρανίου και των οστών του προσώπου που θα μπορούσαν να εξελιχθούν σε BD
- S06: Ενδοκράνιος τραυματισμός
- S07: Τραυματισμός της κεφαλής από σύνθλιψη
- S09: Άλλοι και διάφοροι τραυματισμοί της κεφαλής
- I60-I69: Παθήσεις των αγγείων του εγκεφάλου
- G00-G09: Φλεγμονώδεις παθήσεις του ΚΝΣ
- G93.6: Εγκεφαλικό οίδημα
- I46: Καρδιακή παύση
- R57: Καταπληξία που δεν ταξινομείται αλλού

Απόλυτες αντενδείξεις για πιθανότητα δωρεάς από αποβιώσαντα δότη

- Ηλικία >85 ετών
- Πρωτοπαθές λέμφωμα εγκεφάλου
- Όλοι οι δευτεροπαθείς όγκοι του εγκεφάλου
- Οποιοσδήποτε ενεργός καρκίνος με ενδείξεις εξάπλωσης εκτός του προσβεβλημένου οργάνου, εντός 3 ετών πριν από την δωρεά **
- Μελάνωμα (εκτός από καρκίνο σταδίου 1 που έχει εξαιρεθεί πλήρως)
- Ενεργή (όχι σε ύφεση) αιματολογική κακοήθεια (μυέλωμα, λέμφωμα, λευχαιμία)
- Αποδεδειγμένη, προφανής ή πιθανή περίπτωση σπογγώδους εγκεφαλοπάθειας μεταδιδόμενης από άνθρωπο (TSE), στην οποία συμπεριλαμβάνεται η νόσος Creutzfeldt-Jakob (CJD) και η παραλλαγή Creutzfeldt-Jakob disease (vCJD), άτομα που εξ αίματος συγγενείς τους παρουσίασαν οικογενή CJD, λοιπές
- νευροεκφυλιστικές ασθένειες που σχετίζονται με μολυσματικούς παράγοντες
- Φυματίωση (TB): ενεργή άνευ θεραπείας
- Λοίμωξη από Ιό του Δυτικού Νείλου (WNV) #
- HIV νόσος (αλλά όχι HIV μόλυνση*)



Emergency Department

ICU to enable donation

- Elective non therapeutic mechanical ventilation
- Organ donation: end of life care of patient

Hospital ward

Intensive Care to enable Organ Donation

- Key role of intensivists
- Protection – optimization of organ function
- Goal directed protocols to increase the number of donated organs and decrease cardiac arrests of donors
- Donors require the same meticulous treatment as living patients focus towards saving other patients' lives

I Martin Loaches et al. *Intensive Care Med* 2019

What I talk about when I talk about…
Intensive Care to facilitate Organ Donation

20-30% OF POSSIBLE DONORS ARE OUTSIDE OUR ICUs.

- **the initiation or continuation of intensive care measures** (e.g. admission to the ICU, respiratory support, haemodynamic support)
- in patients with **devastating brain injury** (imminent risk of death of a neurologic cause) in whom intensive care with a therapeutic purpose has been deemed **futile**
- **who are considered possible donors** (BD is likely to occur within a short period of time and there are no apparent medical contraindications to organ donation)
- in order to incorpórate the **option of DBD into their end-of-life care pathway**

Martín Delgado MC, et al. Am J Transplant 2019; 19(6):1782-1791

Maintenance

American Journal of Transplantation 2011; 11: 1517–1521
Wiley Periodicals Inc.

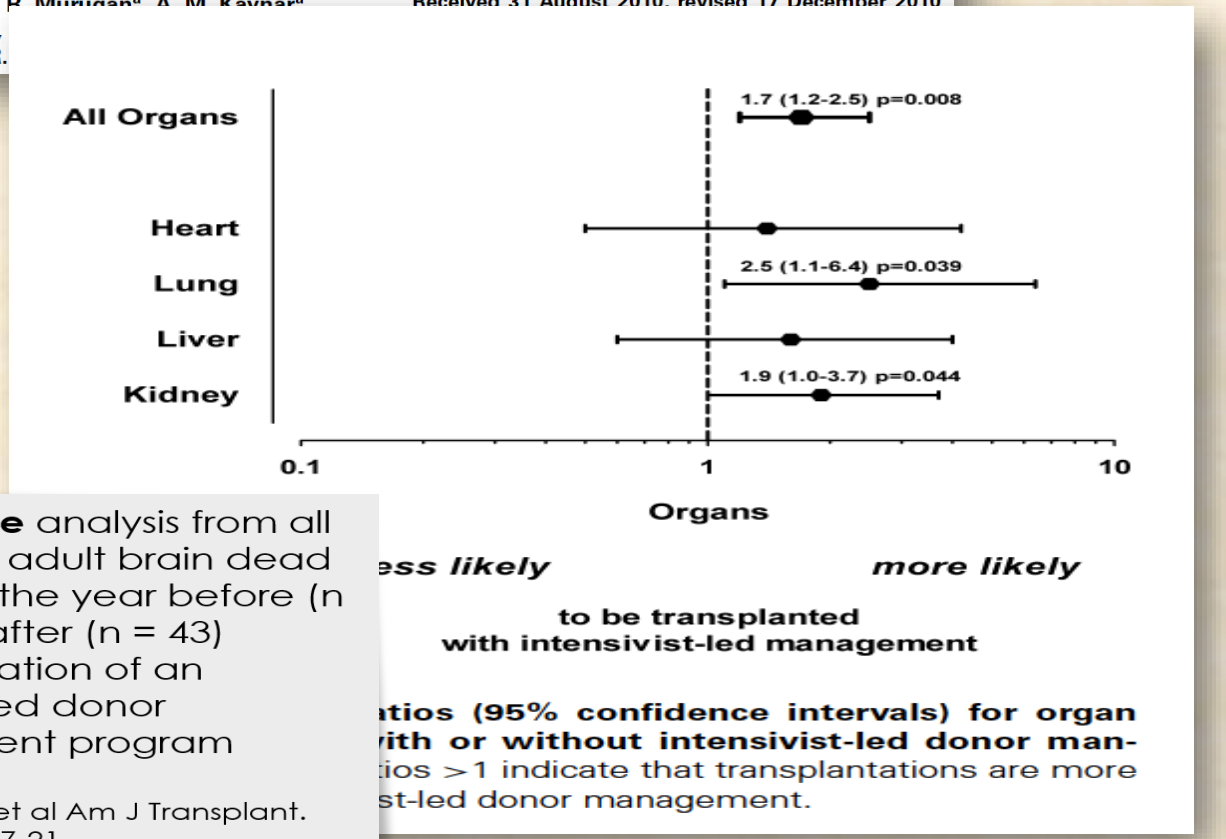
doi: 10.1111/j.1600-6143.2011.03485.x

Brief Communication

Intensivist-Led Management of Brain-Dead Donors Is Associated with an Increase in Organ Recovery for Transplantation

K. Singbartl[a,*], R. Murugan[a], A. M. Kaynar[a]
D. W. Crippen[a],
S. A. Stuart[b], R.

Received 31 August 2010, revised 17 December 2010



Retrospetive analysis from all consented adult brain dead patients in the year before (n = 35) and after (n = 43) implementation of an intensivist-led donor management program

SINGBARTL K, et al Am J Transplant. **2011**;11(7):1517-21

SEMICYUC ONT

PROTOCOLO NACIONAL DE MANTENIMIENTO DEL POTENCIAL DONANTE EN MUERTE ENCEFÁLICA

COORDINADOR

Eduardo Miñambres García, Coordinador Autonómico de Trasplantes de Cantabria, Servicio de Medicina Intensiva, Hospital Universitario Marqués de Valdecilla, Santander. Facultad de Medicina, Universidad de Cantabria

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Luis Martín Villén, Coordinador Sectorial de Trasplantes de Sevilla-Huelva, Unidad de Gestión Clínica de Medicina Intensiva, Hospital Universitario Virgen del Rocío, Sevilla.

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Marina Pérez Redondo, Coordinadora Hospitalaria de Trasplantes, Servicio de Medicina Intensiva, Hospital Universitario Puerta de Hierro, Majadahonda.

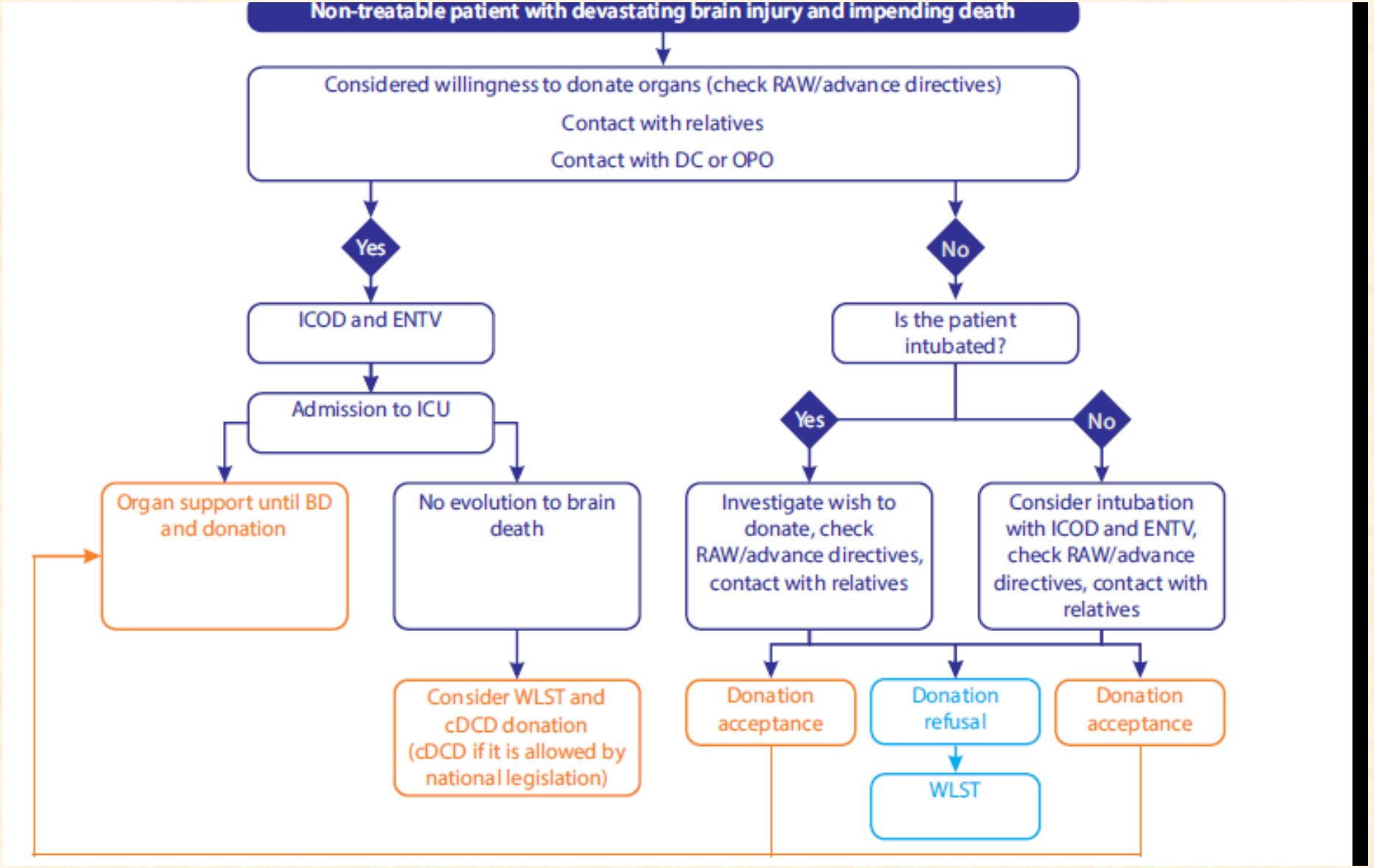
INICIATIVA PROMOVIDA POR LA COMISIÓN PARITARIA SOCIEDAD ESPAÑOLA DE MEDICINA INTENSIVA, CRÍTICA Y UNIDADES CORONARIAS (SEMICYUC) Y ORGANIZACIÓN NACIONAL DE TRASPLANTES (ONT)

Febrero 2020

General evaluation of deceased organ donor

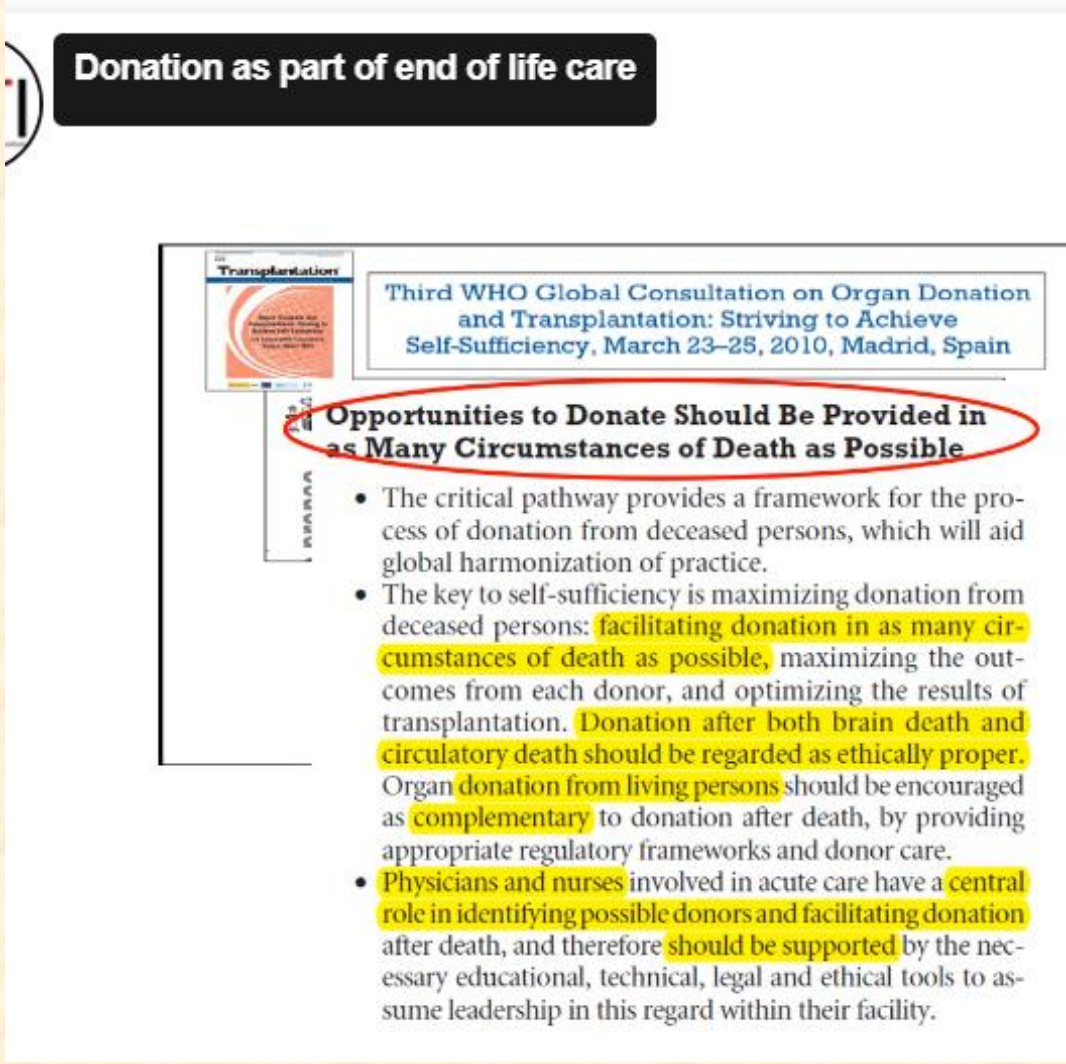
- History
- Clinical evaluation
- Physical examination
- Lab tests

Assessment of quality of each potentially donated organ

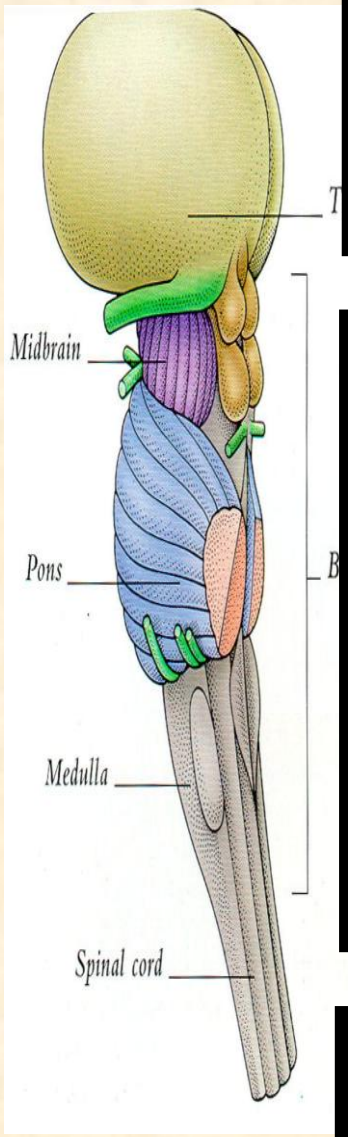

Non-treatable patient with devastating brain injury and impending death
Considered willingness to donate organs (check RAW/advance directives)
Contact with relatives
Contact with DC or OPO
Yes
No
ICOD and ENTV
Admission to ICU
Is the patient intubated?
Yes
No
Organ support until BD and donation
No evolution to brain death
Investigate wish to donate, check RAW/advance directives, contact with relatives
Consider intubation with ICOD and ENTV, check RAW/advance directives, contact with relatives
Consider WLST and cDCD donation (cDCD if it is allowed by national legislation)
Donation acceptance
Donation refusal
Donation acceptance
WLST

Legal and ethical concerns about ICOD

- Fulfil patient's best interests
- Patient's living will and beliefs
- Respect individual autonomy and dignity



OUTCOME



- Encephalus
  - Brain le
  - Hypot and P gland d
- Brain-stem
  - Mesen Isch
  - Pons I
  - Medula isch (Vagu
  - Resp Ce Dysfu
- PNS
  - Spine Ischemia

- Platelets unction
- pothermia
- povolemia
- potension
- rhythmias
- pertension
- eurogenic Edema

vasomotor tone loss

Vall d'Hebron

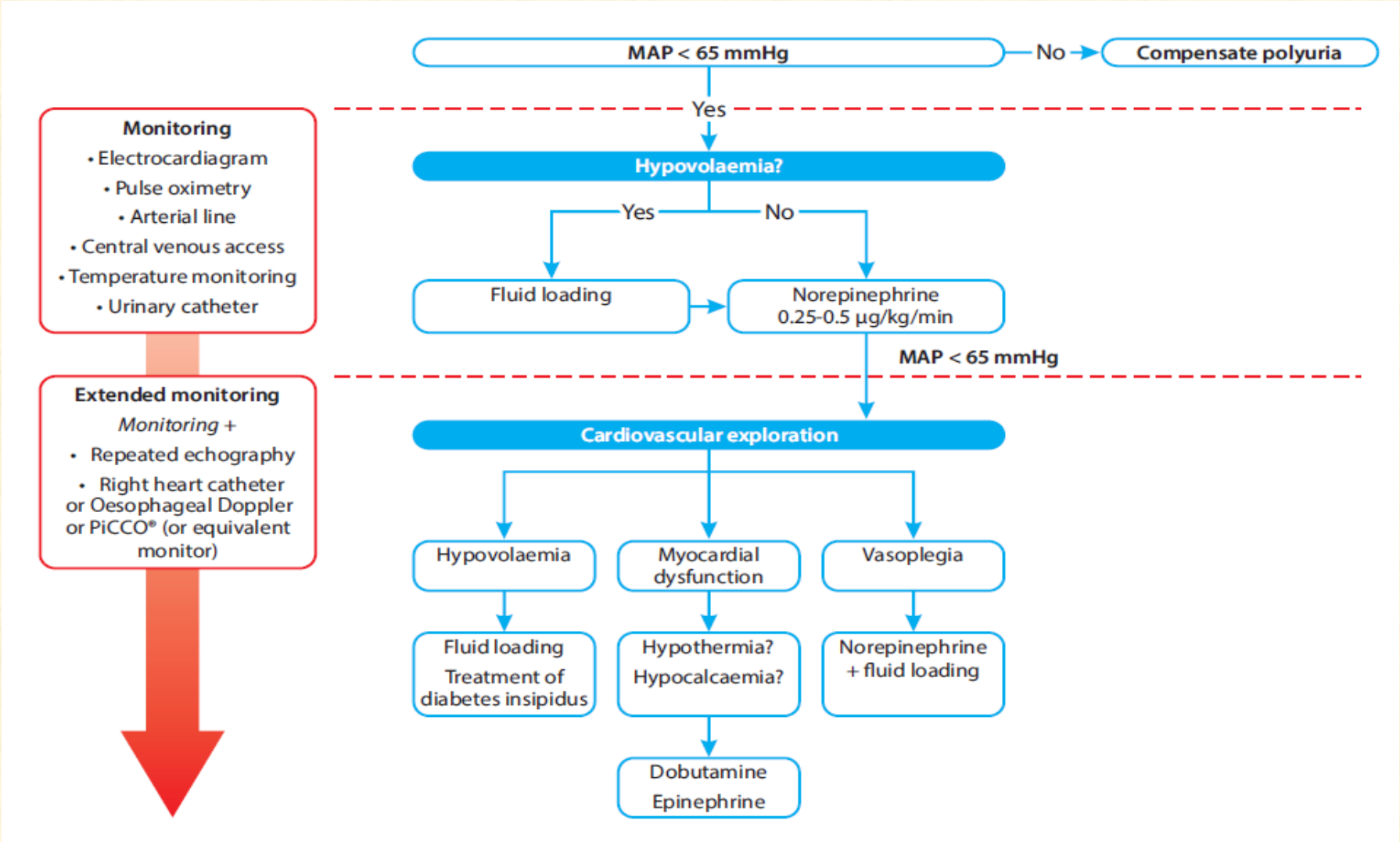
Donor optimization

Goal directed protocols to increase the number of donated organs
Donor therapy

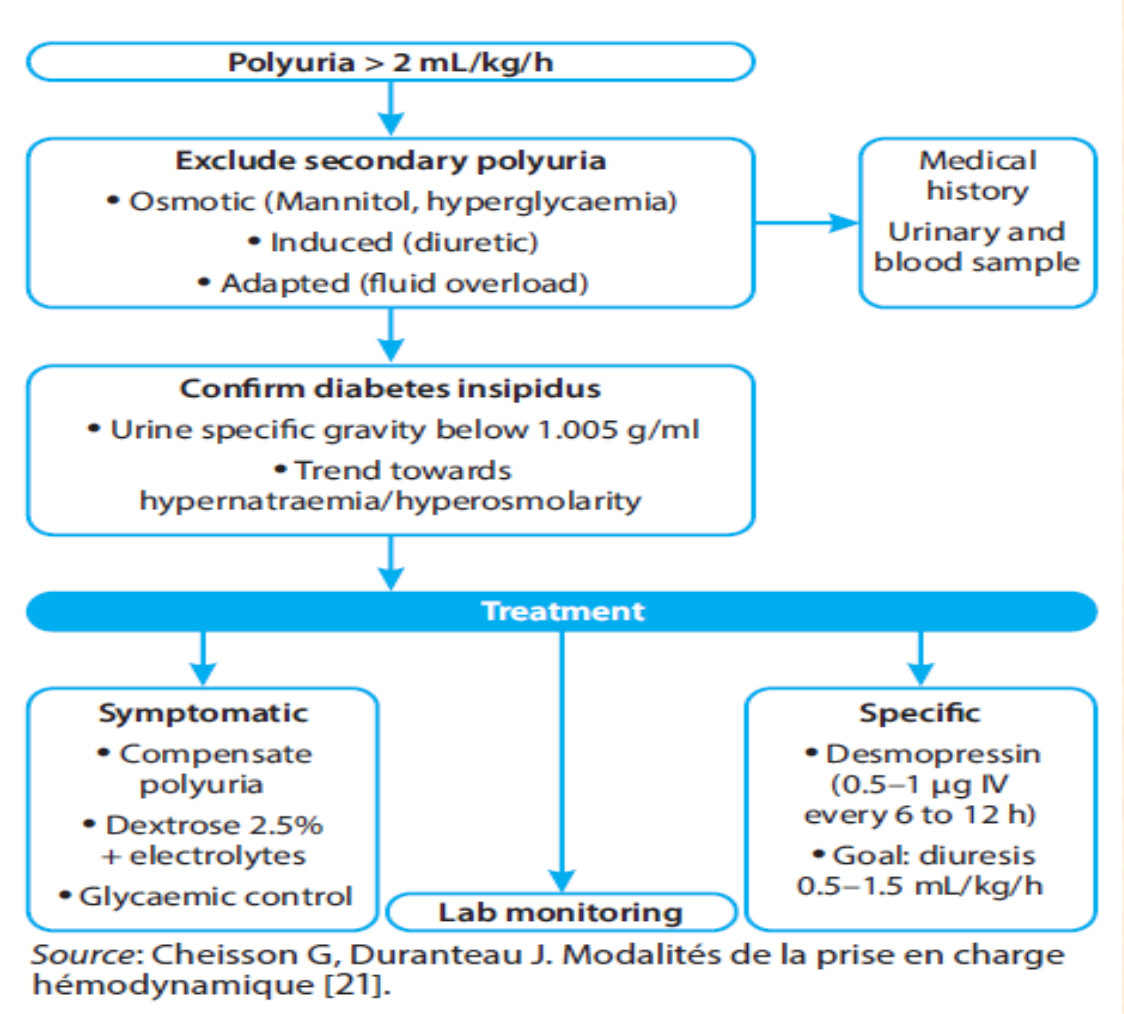
From brain to organ directed therapy

Hemodynamic objectives

Guide to the quality and safety of
ORGANS FOR TRANSPLANTATION



Diabetes insipidus: 46-86% of BDOD



Source: Cheisson G, Duranteau J. Modalités de la prise en charge hémodynamique [21].

CDI and hypotension: Vasopressin: increase organ retrieval rates

Na<155 mg/dL

Guide to the quality and safety of ORGANS FOR TRANSPLANTATION

VENTILATORY STRATEGY

Effect of a Lung Protective Strategy for Organ Donors on Eligibility and Availability of Lungs for Transplantation

A Randomized Controlled Trial

Multicenter randomized controlled trial of potential organ donors in 12 European ICU s 09/2004 to 05/2009. N= 118

MAIN OUTCOME : number of organ donors meeting eligibility criteria for harvesting, number of lungs harvested, and 6-month survival of lung transplant recipients.

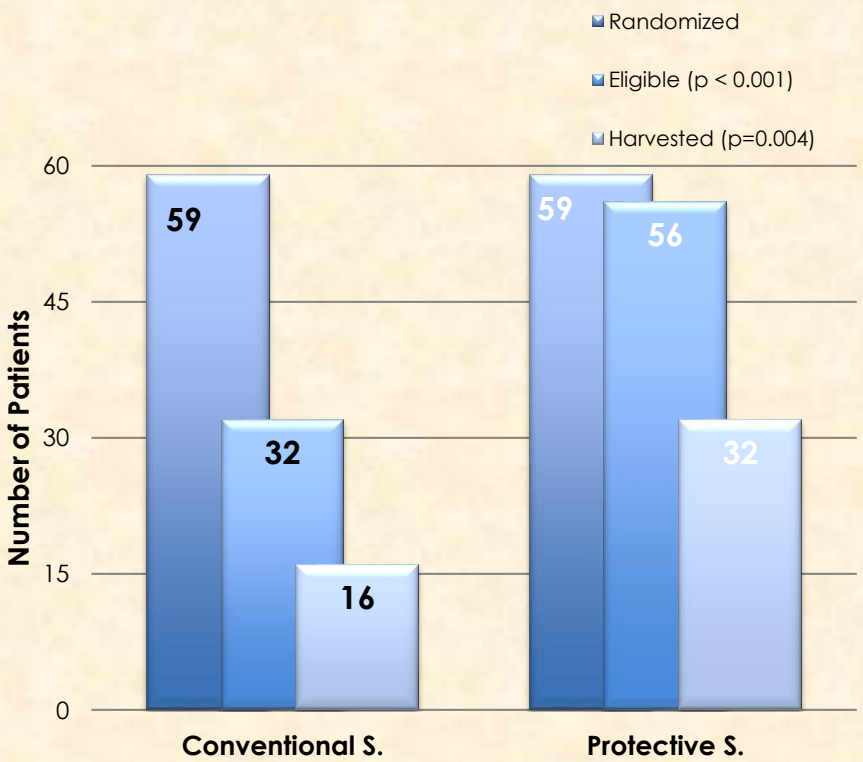
Mascia L. J Am Med Assoc **2010**; 304: 2620-7

Protective Strategy

- Tidal Vol: 6 – 8 ml kg^{-1}
- PEEP: 8 – 10 cmH_2O
- Apnea test (CPAP)
- Closed circuit for airway suction

Conventional Strategy

- Tidal Vol: 10 - 12 ml kg^{-1}
- PEEP: 3 - 5 cmH_2O
- Apnea Test by disconnecting
- Open circuit for airway suction



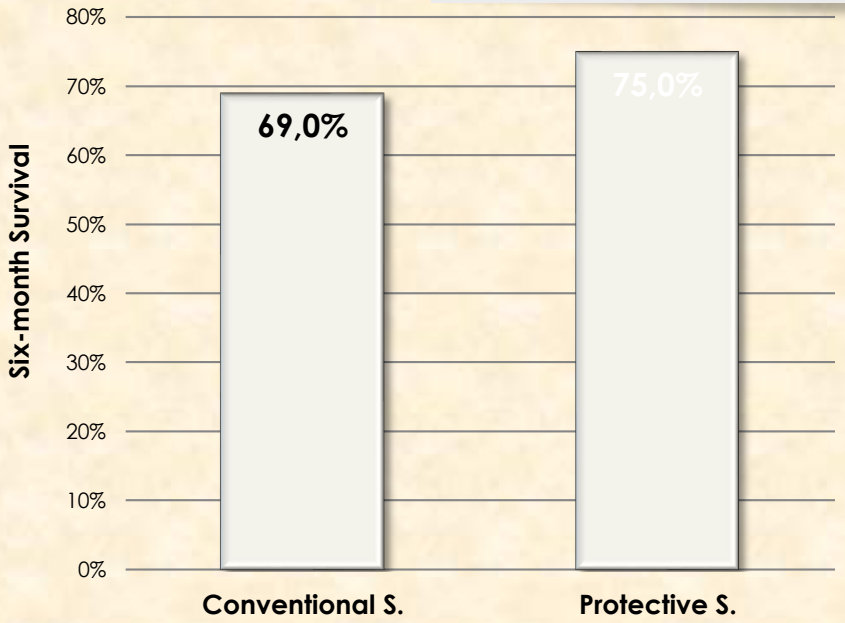


Table 5.4. Interventions for a lung-protective strategy

Intervention	Comment/Recommendation
Apnoea test	It should be performed with ventilator on CPAP mode. It is recommended to perform a single recruitment manoeuvre immediately after testing with attention to haemodynamic instability
Mechanical ventilation	Lowest FiO_2 possible Plateau pressure < 30 cm H_2O PEEP 8-10 cm H_2O (a high PEEP prevents lung oedema and helps prevent atelectasis)* Tidal volume 6-8 mL/kg
Recruitment manoeuvres**	Once per hour and after every disconnection from the ventilator
Bronchoscopy	With bilateral bronchoalveolar lavage, immediately after brain death
Close monitoring of haemodynamics [25-26]	With PiCCO or equivalent monitor EVLW < 10 mL/kg (administering diuretics, if necessary) CVP < 8 mmHg
Methylprednisolone	15 mg/kg after brain death declaration
Semi-lateral decubitus position	In lung donors with PaO_2/FiO_2 <300 mmHg
Closed circuit for tracheal suction	Any loss of pressurisation caused by tube disconnection must be avoided to decrease the risk of atelectasis
Avoid any decrease in oxygenation	Appropriate ventilation should be ensured during stay at ICU, during any transfer within the hospital and during surgery in the operating theatre at procurement with a target PaO_2/FiO_2 > 300 mmHg (> 40.0 kPa)

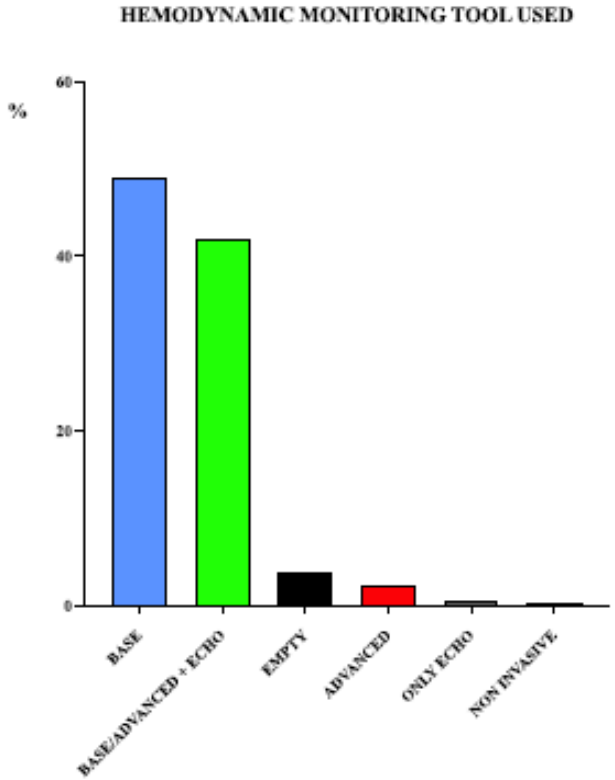
Deana et al. J Anesth Analg Crit Care (2025) 5:72
https://doi.org/10.1186/s44158-025-00292-5

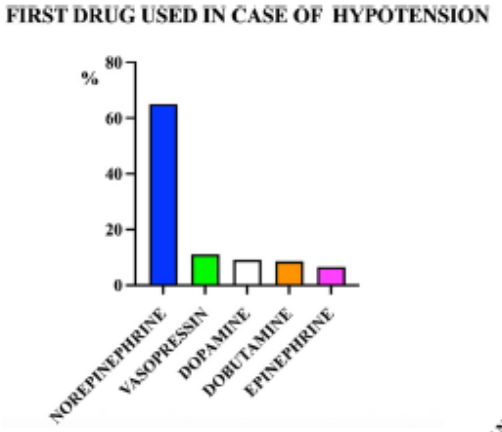
Journal of Anesthesia, Analgesia and Critical Care

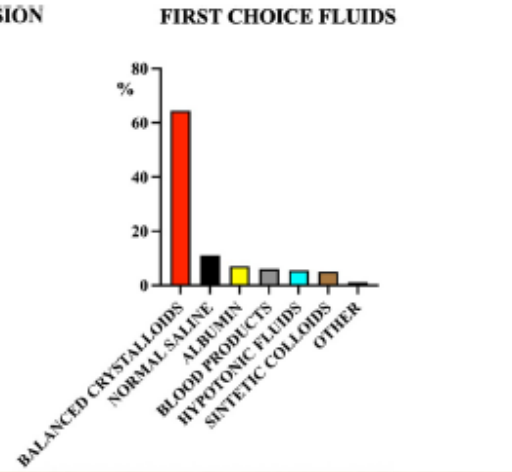
RESEARCH Open Access

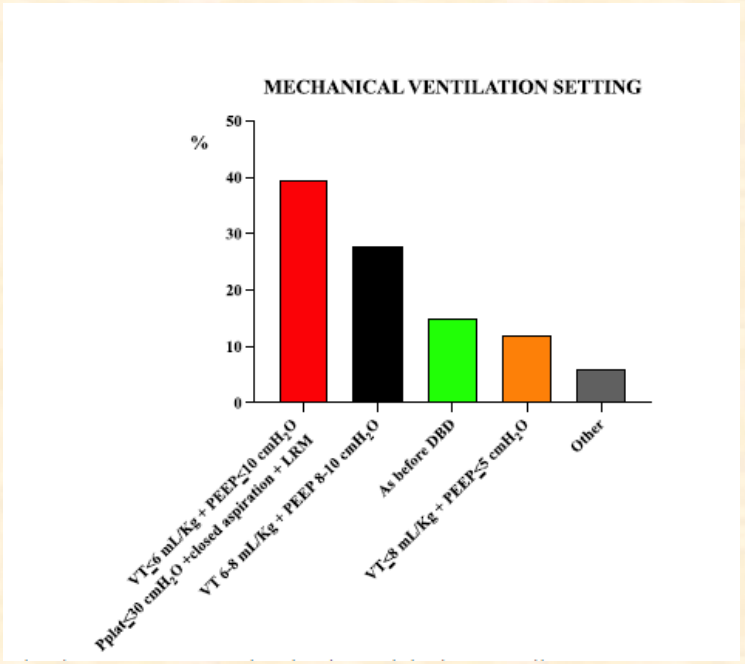
Management of adult organ donors after brain death in ICU: insights from an Italian survey

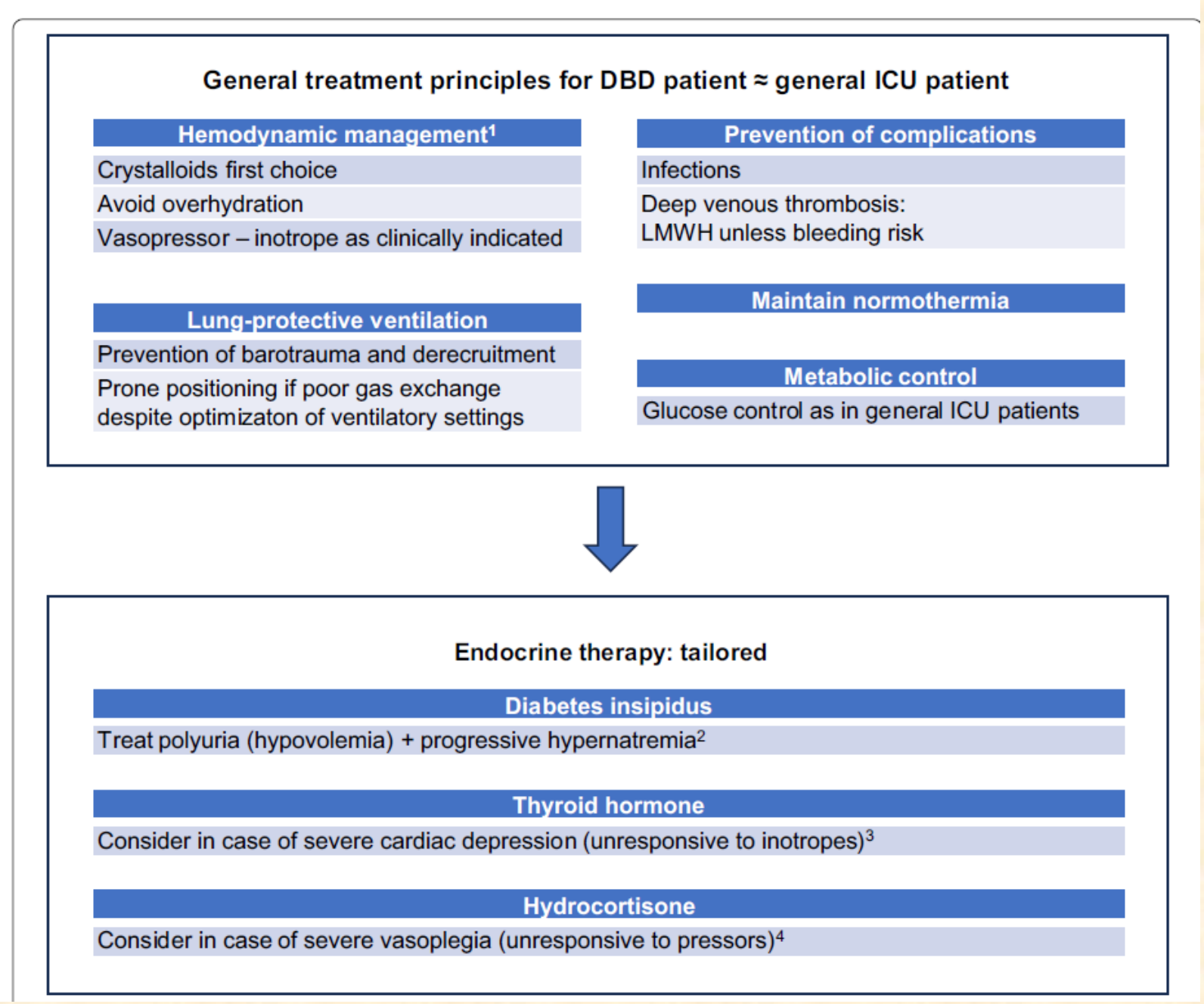
Cristian Deana[1†], Marinella Zanierato[2†], Daniele Guerino Biasucci[3], Gaetano Burgio[4], Michele Umbrello[5], Luciana Mascia[6], Luigi Vetrugno[7*] and Elena Giovanna Bignami[8]







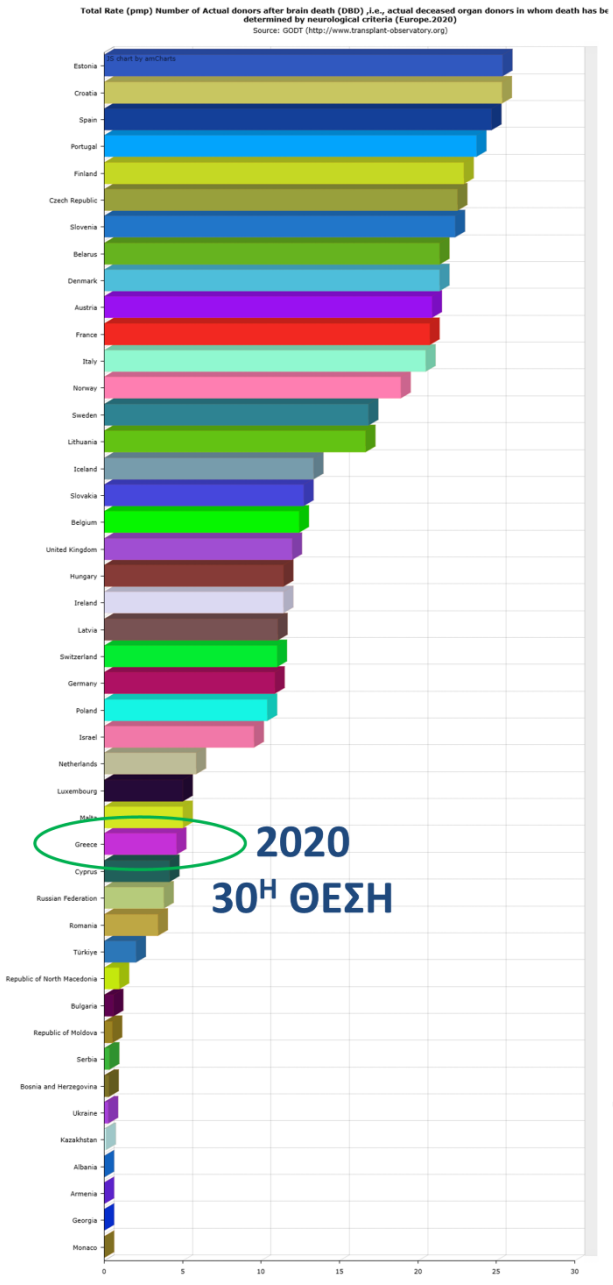


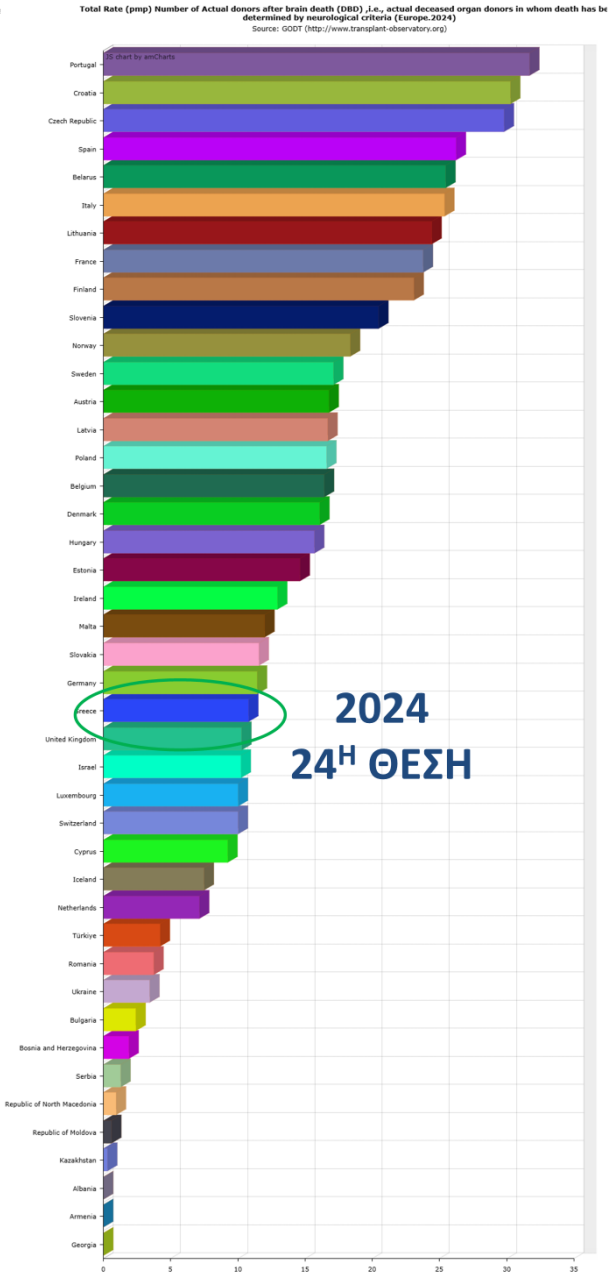


J.Gunst, M.Souter. *Int Care Med* 2024

Η κατάσταση βελτιώνεται …

ΕΥΡΩΠΑΙΚΗ ΚΑΤΑΤΑΞΗ
ΒΑΣΕΙ ΔΕΙΚΤΩΝ ΔΩΡΕΑΣ
ΑΠΟ ΔΟΤΕΣ ΕΠΕΙΤΑ
ΑΠΟ **ΝΕΥΡΟΛΟΓΙΚΟ**
ΘΑΝΑΤΟ (DBD)

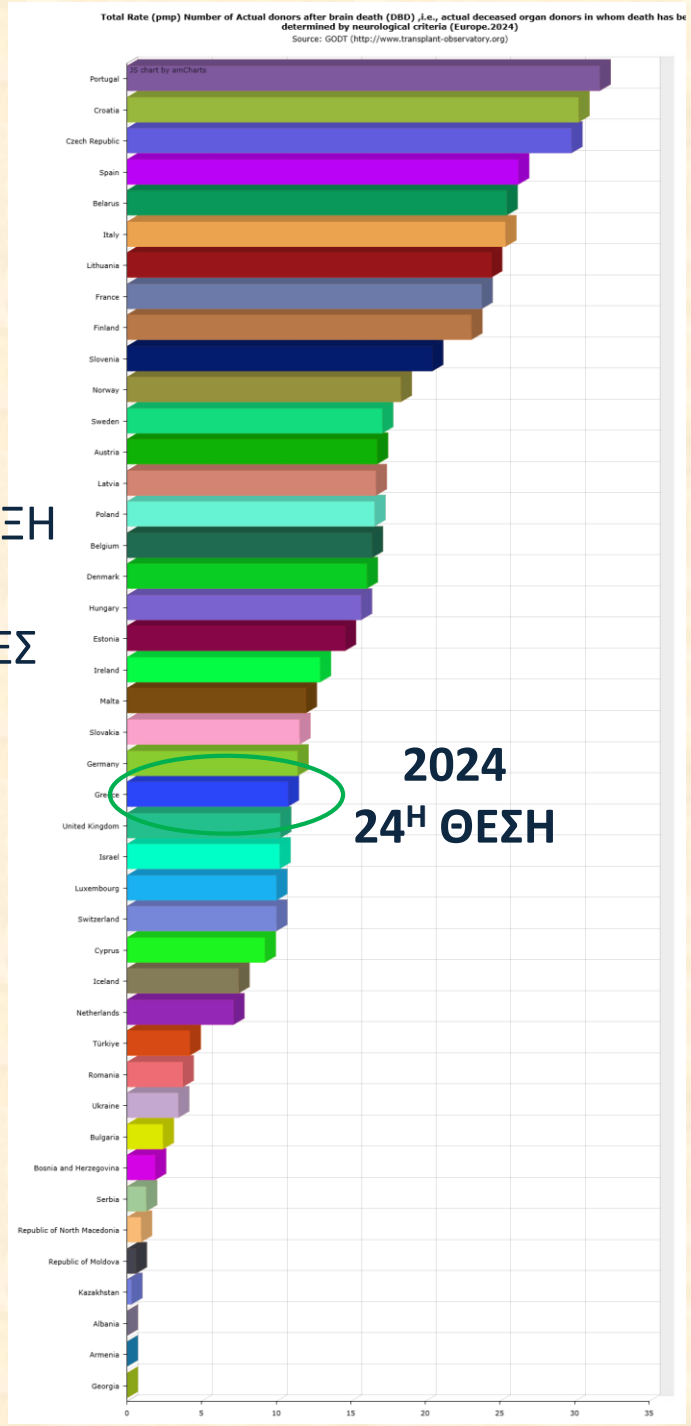




https://www.transplant-observatory.org/

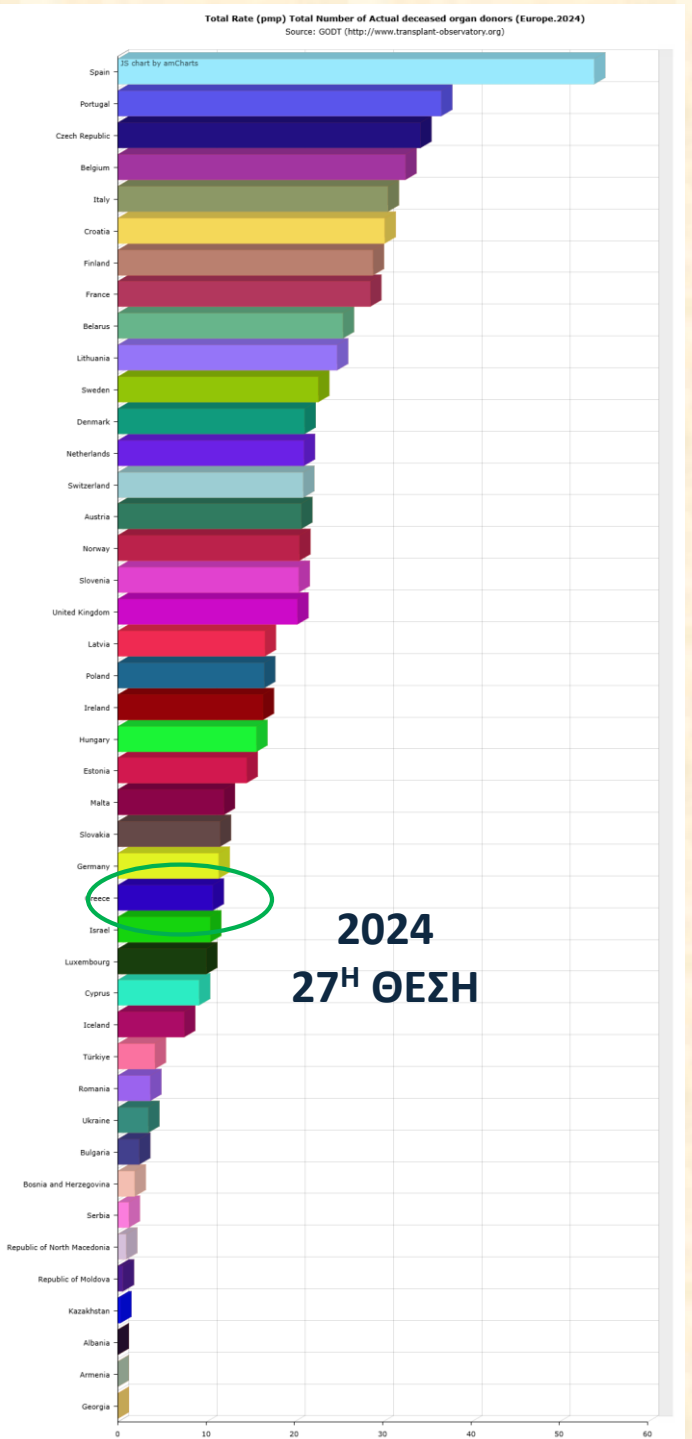
Υπάρχει όμως μακρύς δρόμος ακόμα …

ΕΥΡΩΠΑΙΚΗ ΚΑΤΑΤΑΞΗ
ΒΑΣΕΙ ΔΕΙΚΤΩΝ
ΔΩΡΕΑΣ ΑΠΟ ΔΟΤΕΣ
ΕΠΕΙΤΑ ΑΠΟ
ΝΕΥΡΟΛΟΓΙΚΟ
ΘΑΝΑΤΟ (DBD)



2024
24^{Η} ΘΕΣΗ

ΕΥΡΩΠΑΙΚΗ ΚΑΤΑΤΑΞΗ
ΒΑΣΕΙ ΔΕΙΚΤΩΝ
ΔΩΡΕΑΣ ΑΠΟ ΔΟΤΕΣ
ΕΠΕΙΤΑ ΑΠΟ
ΝΕΥΡΟΛΟΓΙΚΟ
ΘΑΝΑΤΟ (DBD)
+
ΚΥΚΛΟΦΟΡΙΚΟ
ΘΑΝΑΤΟ (DCD)



2024
27^{Η} ΘΕΣΗ

ΕΛΛΗΝΙΚΟΣ ΟΡΓΑΝΙΣΜΟΣ ΜΕΤΑΜΟΣΧΕΥΣΕΩΝ

Δείκτες αξιοποίησης μοσχευμάτων ανά δότη

ΜΕΤΑΜΟΣΧΕΥΣΕΙΣ ΣΥΜΠΑΓΩΝ ΟΡΓΑΝΩΝ ΣΤΗΝ ΕΛΛΑΔΑ	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Μεταμοσχεύσεις στην Ελλάδα από Εγχώριους Αποβιώσαντες Δότες	127	90	101	141	102	150	120	121	158	193	230	285
Δείκτης Εγχώριας Αξιοποίησης Μοσχευμάτων (πόσα όργανα μεταμ/νται από έναν δότη)	2,5	2,3	2,0	2,1	2,3	2,5	2,5	2,3	2,3	2,2	2,1	2,1

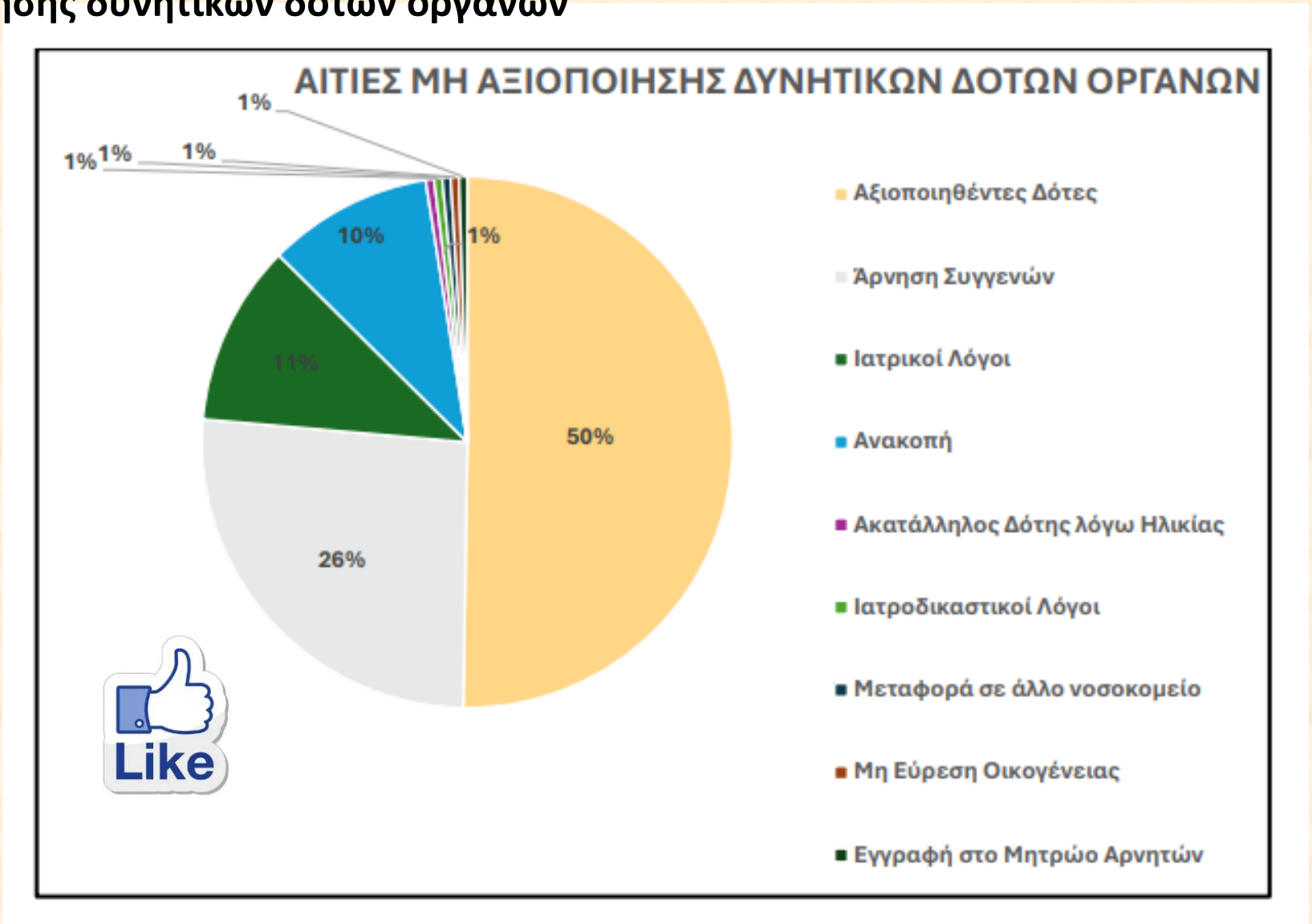
ΜΕΤΑΜΟΣΧΕΥΣΕΙΣ ΣΥΜΠΑΓΩΝ ΟΡΓΑΝΩΝ ΣΕ ΕΛΛΑΔΑ ΚΑΙ ΕΞΩΤΕΡΙΚΟ ΑΠΟ ΕΓΧΩΡΙΟΥΣ ΔΟΤΕΣ	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Μεταμοσχεύσεις στο Εξωτερικό από Εγχώριους Αποβιώσαντες Δότες	7	9	24	22	23	25	3	11	14	22	23	35
Μεταμοσχεύσεις σε Ελλάδα & Εξωτερικό από Εγχώριους Αποβιώσαντες Δότες	134	99	125	163	125	175	123	132	172	215	253	320
Δείκτης Πλήρους Αξιοποίησης Μοσχευμάτων από Εγχώριους Δότες (πόσα όργανα μεταμ/νται από έναν δότη)	2,7	2,5	2,5	2,4	2,8	2,9	2,6	2,5	2,5	2,5	2,3	2,4

Εγχώρια Μοσχεύματα προσφερθέντα & μεταμοσχευθέντα στο Εξωτερικό

ΧΩΡΑ	Νεφροί	Ήπαρ	Καρδιά	Πνεύμονες	ΣΥΝΟΛΟ ανά χώρα
Ιταλία	-	19	13	-	32
Γερμανία	-	-	1	1	2
Ουγγαρία	-	-	1	-	1
Σύνολο	-	19	15	1	35

ΕΛΛΗΝΙΚΟΣ ΟΡΓΑΝΙΣΜΟΣ ΜΕΤΑΜΟΣΧΕΥΣΕΩΝ

Αιτίες μη αξιοποίησης δυνητικών δοτών οργάνων



ΕΛΛΗΝΙΚΟΣ ΟΡΓΑΝΙΣΜΟΣ ΜΕΤΑΜΟΣΧΕΥΣΕΩΝ

Δωρεά Οργάνων ανά Νοσοκομείο (ΜΕΘ) βάσει αριθμό Μοσχευμάτων που μεταμοσχεύτηκαν

ΝΟΣΟΚΟΜΕΙΟ - ΜΕΘ		ΔΟΤΕΣ ΟΡΓΑΝΩΝ	ΑΡΙΘΜΟΣ ΜΟΣΧΕΥΜΑΤΩΝ ΠΟΥ ΑΞΙΟΠΟΙΗΘΗΚΑΝ	ΔΕΙΚΤΗΣ ΑΞΙΟΠΟΙΗΣΗΣ ΟΡΓΑΝΩΝ ΑΝΑ ΔΟΤΗ
ΑΘΗΝΑ	Π.Γ.Ν. ΑΤΤΙΚΟΝ	17	40	2.35
ΑΘΗΝΑ	Γ.Ν.Α. ΚΑΤ*	13	34	2.62
ΑΘΗΝΑ	Ε.Ε.Σ. ΚΟΡΓΙΑΛΕΝΕΙΟ ΜΠΕΝΑΚΕΙΟ*	11	29	2.64
ΑΘΗΝΑ	Γ.Ν.Ν.Θ.Α. ΣΩΤΗΡΙΑ*	19	28	1.47
ΑΘΗΝΑ	Γ.Ν.Α. Ο ΕΥΑΓΓΕΛΙΣΜΟΣ*	6	26	4.33
ΘΕΣΣΑΛΟΝΙΚΗ	Γ.Ν.Θ. Γ. ΠΑΠΑΝΙΚΟΛΑΟΥ*	8	19	2.38
ΔΥΤ. ΕΛ. ΠΕΛΟΠΟΝ.	Π.Γ.Ν. ΙΩΑΝΝΙΝΩΝ*	7	15	2.14
ΘΕΣΣΑΛΟΝΙΚΗ	Γ.Ν.Θ. ΙΠΠΟΚΡΑΤΕΙΟ*	4	13	3.25
ΔΥΤ. ΕΛ. ΠΕΛΟΠΟΝ.	Π.Γ.Ν. ΡΙΟΥ ΠΑΤΡΩΝ*	5	11	2.2
ΚΡΗΤΗ - ΑΙΓΑΙΟ	Γ.Ν. ΗΡΑΚΛΕΙΟΥ ΒΕΝΙΖΕΛΕΙΟ*	5	10	2.0
ΚΕΝΤΡΙΚΗ ΕΛΛΑΔΑ	Π.Γ.Ν. ΛΑΡΙΣΑΣ*	2	2	1.0
ΑΘΗΝΑ	Γ.Ν.Α. ΣΙΣΜΑΝΟΓΛΕΙΟ	1	2	2.0
ΚΡΗΤΗ - ΑΙΓΑΙΟ	ΠΕ.ΠΑ.Γ.Ν. ΗΡΑΚΛΕΙΟΥ ΜΕΘ ΠΑΙΔΩΝ*	1	2	2.0
ΑΘΗΝΑ	ΜΗΤΕΡΑ	1	1	1.0
ΚΡΗΤΗ - ΑΙΓΑΙΟ	Γ.Ν. ΜΥΤΙΛΗΝΗΣ ΒΟΣΤΑΝΕΙΟ	1	1	1.0
ΣΥΝΟΛΟ		137	332	2.42

				2.0
				3.0
				4.5
				2.33
				2.33
				1.5
				3.0
				3.0
				2.5
				2.5
				5.0
				2.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0
				3.0

Δότες Ελλάδας 2020-2024

Αττικό	56
Παπανικολάου	27
Ευαγγελισμός	24
ΝΝΘΑ Σωτηρία	23
Παπαγεωργίου	21
ΠΑΓΝ Ηρακλείου	20
Πανεπιστημιακό Πάτρας	17 (7 παιδιά)
Πανεπιστημιακό Ιωαννίνων	17
Ιπποκράτειο Θεσσαλονίκης	15
ΚΑΤ	11

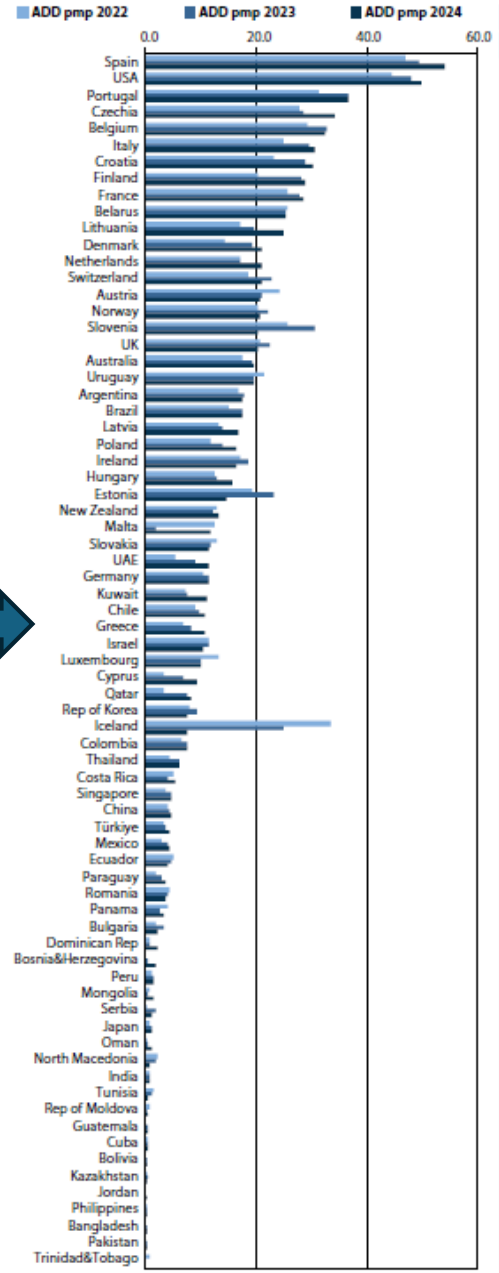
Περιλαμβάνονται όλα τα νοσοκομεία με διψήφιο αριθμό δοτών την πενταετία

LUTX 60 (2020:3-2021:5-2022:11-2023:12-2024:13-2025:13-2026:3)

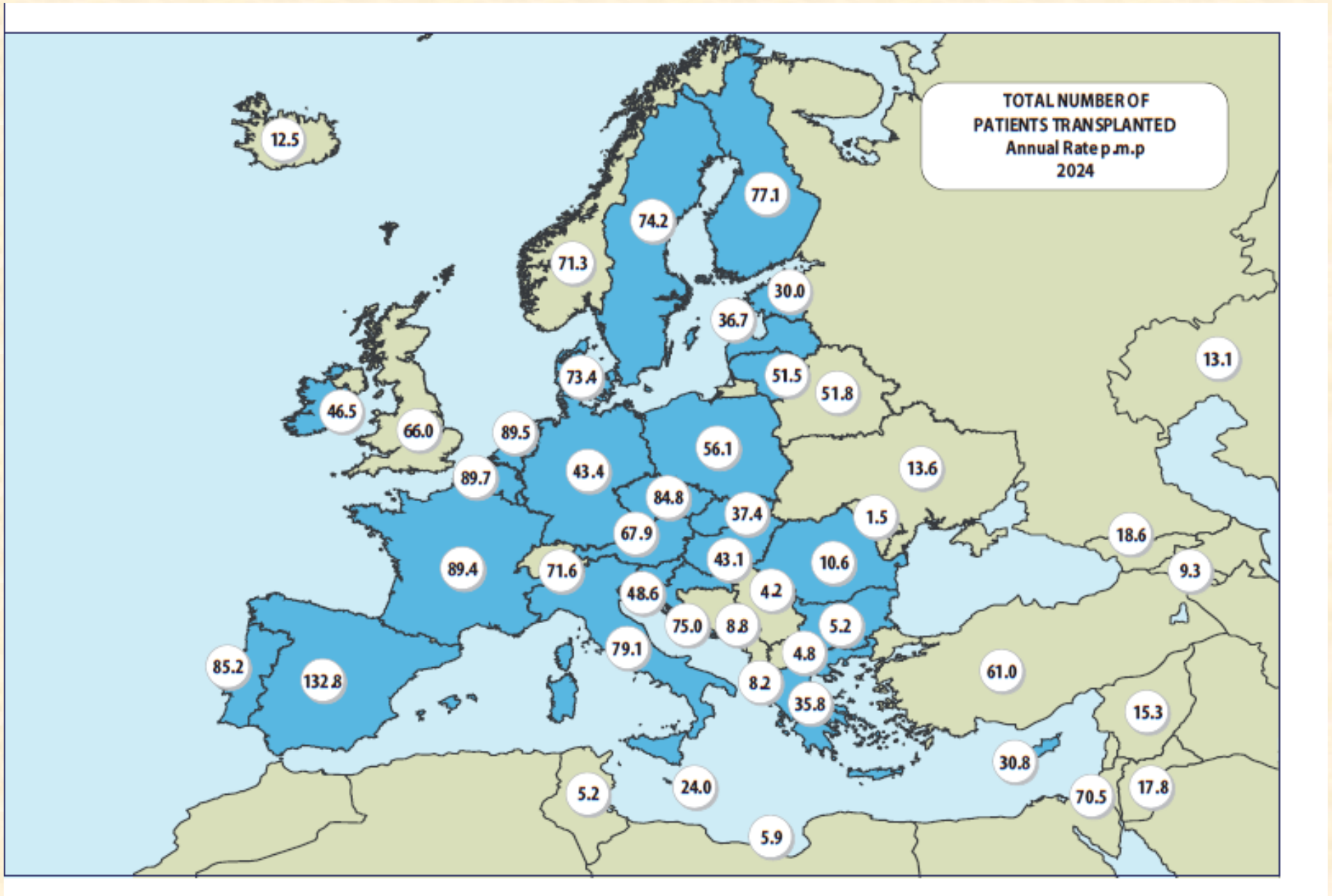
- Π.Γ.Ν.ΑΤΤΙΚΟΝ (ΔΟΤΕΣ 15)
- Π.Γ.Ν.ΠΑΤΡΩΝ (4)
- ΕΥΑΓΓΕΛΙΣΜΟΣ - Γ.Ν.ΙΠΠΟΚΡΑΤΕΙΟ ΘΕΣ.-Σωτηρία – ΚΑΤ- ΠΑΠΑΝΙΚΟΛΑΟΥ (3)
- ΒΕΝΙΖΕΛΕΙΟ - ΕΡΥΘΡΟΣ- ΛΑΡΙΣΣΑ (2)
- Γ.Ν.ΝΙΚΑΙΑΣ/ΠΑΠΑΓΕΩΡΓΙΟΥ/ΤΖΑΝΝΕΙΟ/Γ.Ν.ΓΙΑΝΝΙΤΣΩΝ/Γ.Ν.ΖΑΚΥΝΘΟΥ/ ΑΓΡΙΝΙΟ / 251 Γ.Ν.Α./Γ.Ν.ΛΑΜΙΑΣ/ Γ.Ν.ΚΑΤΕΡΙΝΗΣ (1)
- ΚΥΠΡΟΣ (7) – ΡΟΥΜΑΝΙΑ (4)

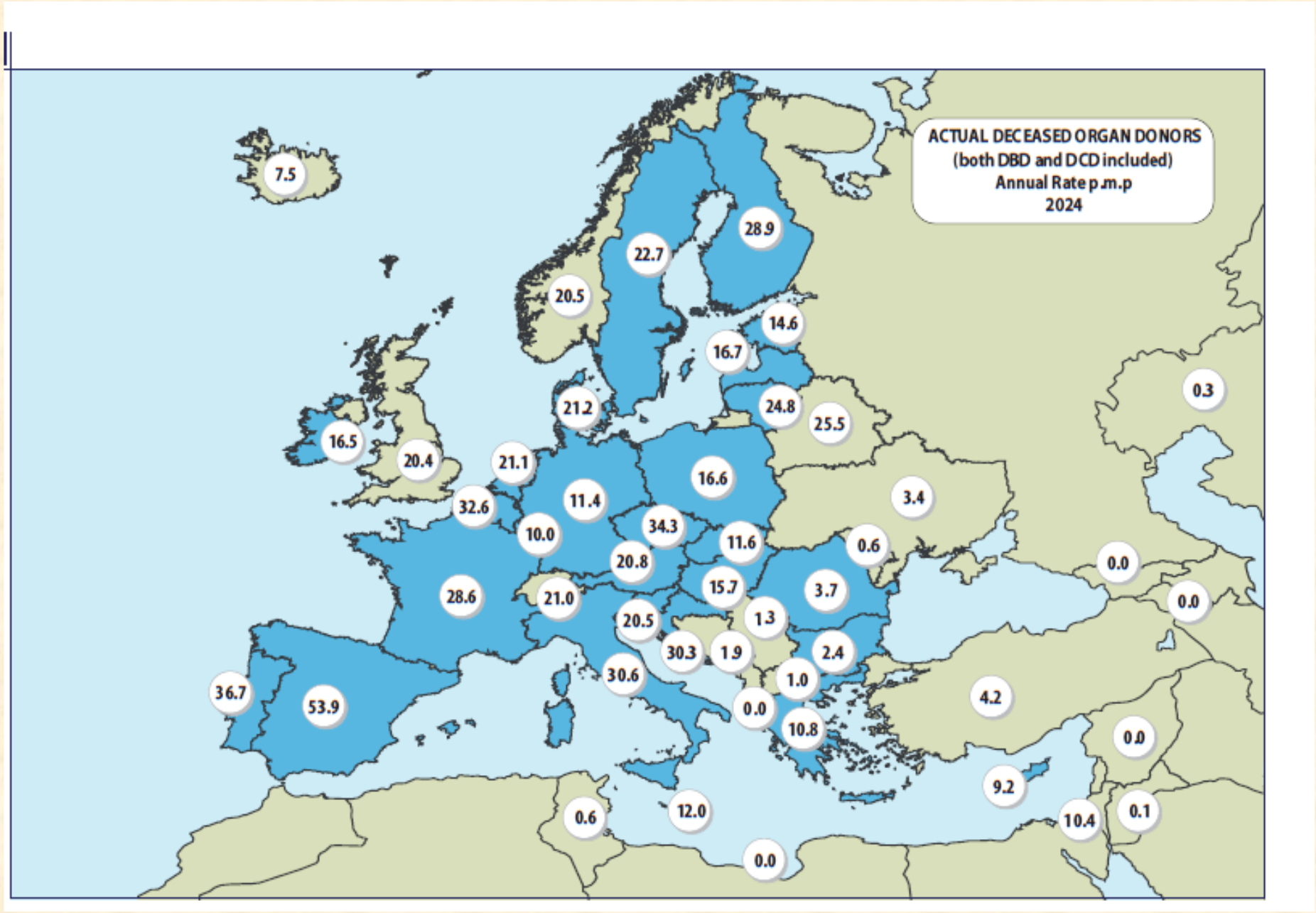
2024 VS 2023 VS 2022. GLOBAL DATA ON ORGAN DONATION AND TRANSPLANTATION

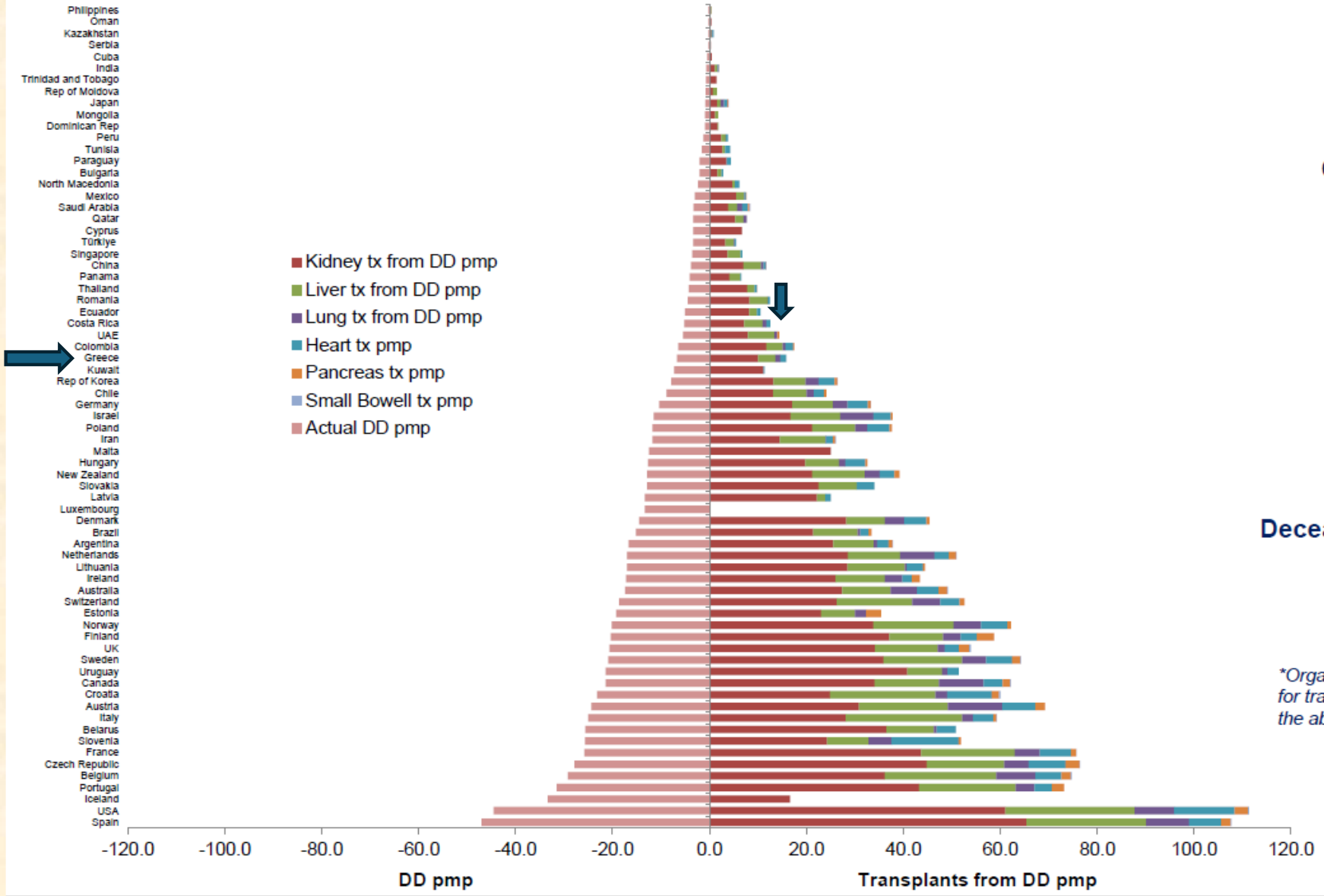
Actual Deceased Donors (ADD)



COUNTRY	2022		2023		2024	
	N	PMP	N	PMP	N	PMP
Argentina	767	16.7	816	17.8	803	17.4
Australia	454	17.4	513	19.4	527	19.7
Austria	222	24.4	188	20.9	187	20.8
Bangladesh	0	0.0	1	0.0	1	0.0
Belarus	241	25.6	240	25.3	242	25.5
Belgium	342	29.2	383	32.7	381	32.6
Bolivia	0	0.0	4	0.3	4	0.3
Bosnia&Herzegovina	0	0.0	2	0.6	6	1.9
Brazil	3266	15.2	3759	17.4	3771	17.3
Bulgaria	14	2.1	22	3.3	16	2.4
Chile	171	8.9	192	9.8	213	10.8
China	5628	3.9	6454	4.5	6744	4.7
Colombia	332	6.4	388	7.4	388	7.4
Costa Rica	27	5.2	21	4.0	29	5.6
Croatia	95	23.2	116	29.0	121	30.3
Cuba	5	0.4	7	0.6	5	0.4
Cyprus	4	3.3	9	6.9	12	9.2
Czechia	298	27.9	299	28.5	360	34.3
Denmark	84	14.5	113	19.2	125	21.2
Dominican Rep	10	0.9	8	0.7	24	2.1
Ecuador	91	5.0	88	4.8	72	3.9
Estonia	25	19.2	30	23.1	19	14.6
Finland	114	20.4	155	28.2	159	28.9
France	1694	25.8	1791	27.6	1856	28.6
Germany	869	10.4	965	11.6	953	11.4
Greece	69	6.7	87	8.4	111	10.8
Guatemala	0	0.0	7	0.4	10	0.5
Hungary	122	12.7	131	12.8	157	15.7
Iceland	10	33.3	10	25.0	3	7.5
India	941	0.7	1099	0.8	1128	0.8
Ireland	86	17.2	95	18.6	84	16.5
Israel	102	11.5	107	11.6	97	10.4
Italy	1509	25.0	1731	29.4	1795	30.6
Japan	108	0.9	145	1.2	138	1.1
Jordan	0	0.0	0	0.0	1	0.1
Kazakhstan	4	0.2	7	0.4	6	0.3
Kuwait	32	7.3	33	7.7	48	11.2
Latvia	24	13.3	25	13.9	30	16.7
Lithuania	46	17.0	53	19.6	67	24.8
Luxembourg	8	13.3	7	10.0	7	10.0
Malta	5	12.5	1	2.0	6	12.0
Mexico	398	3.0	513	4.0	545	4.2
Mongolia	3	0.9	2	0.6	5	1.4
Netherlands	293	17.0	304	17.3	373	21.1
New Zealand	63	12.9	64	12.3	70	13.2
Norway	111	20.2	122	22.2	113	20.5
Oman	1	0.2	2	0.4	5	1.1
Pakistan	0	0.0	2	0.0	1	0.0
Panama	18	4.1	12	2.7	15	3.3
Paraguay	15	2.1	21	3.0	26	3.8
Peru	42	1.2	50	1.5	51	1.5
Philippines	20	0.2	15	0.1	9	0.1
Poland	445	11.8	566	13.8	667	16.6
Portugal	318	31.5	375	36.8	374	36.7
Qatar	10	3.3	20	7.4	22	8.1
Rep of Korea	405	7.9	483	9.3	397	7.7
Rep of Moldova	3	0.8	1	0.3	2	0.6
North Macedonia	5	2.4	4	1.9	2	1.0
Romania	85	4.5	82	4.1	73	3.7
Serbia	2	0.2	13	1.8	9	1.3
Singapore	21	3.6	28	4.7	29	4.8
Slovakia	71	12.9	68	11.7	66	11.6
Slovenia	54	25.7	64	30.5	43	20.5
Spain	2196	47.0	2346	49.4	2562	53.9
Sweden	213	20.9	267	25.2	243	22.7
Switzerland	164	18.6	200	22.7	187	21.0
Thailand	303	4.3	446	6.2	436	6.1
Trinidad&Tobago	1	0.7	0	0.0	0	0.0
Tunisia	19	1.6	17	1.4	8	0.6
Türkiye	289	3.4	305	3.6	364	4.2
UAE	55	5.4	87	9.2	111	11.6
UK	1413	20.6	1513	22.3	1385	20.4
USA	14 905	44.5	16 336	48.0	16 989	49.7
Uruguay	75	21.4	67	19.7	67	19.7


TOTAL NUMBER OF
PATIENTS TRANSPLANTED
Annual Rate p.m.p
2024
12.5
74.2
77.1
71.3
30.0
36.7
73.4
51.5
51.8
13.1
46.5
66.0
89.5
56.1
89.7
43.4
13.6
84.8
37.4
1.5
67.9
18.6
43.1
10.6
89.4
71.6
9.3
48.6
4.2
75.0
8.8
5.2
79.1
4.8
85.2
132.8
61.0
8.2
35.8
15.3
30.8
5.2
24.0
70.5
17.8
5.9


ACTUAL DECEASED ORGAN DONORS
(both DBD and DCD included)
Annual Rate p.m.p
2024
7.5
28.9
22.7
20.5
14.6
16.7
0.3
21.2
24.8
25.5
16.5
20.4
21.1
16.6
3.4
32.6
11.4
34.3
10.0
11.6
0.6
0.0
20.8
15.7
3.7
28.6
21.0
1.3
0.0
20.5
30.3
1.9
2.4
30.6
1.0
36.7
53.9
4.2
0.0
10.8
0.0
9.2
0.6
12.0
10.4
0.1
0.0



Actual deceased organ donors and transplants from deceased donors by type of organ (pmp)

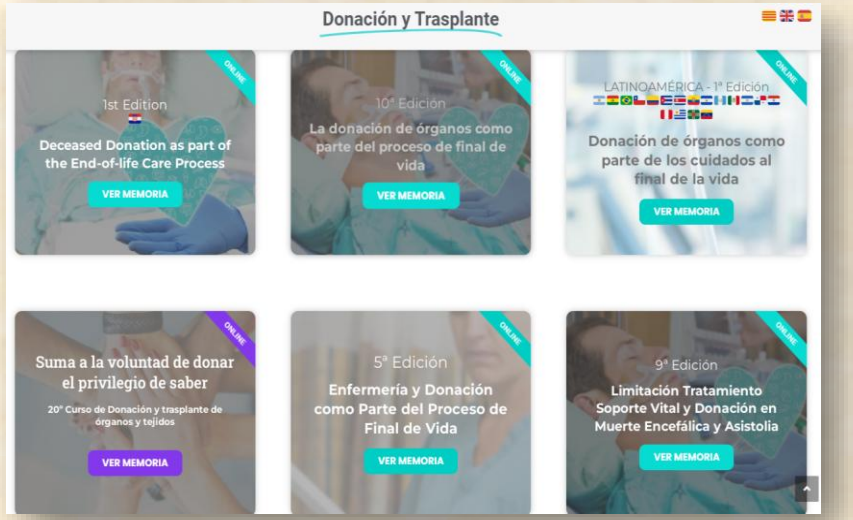
2022

Deceased donation activities reported in 71/91 countries

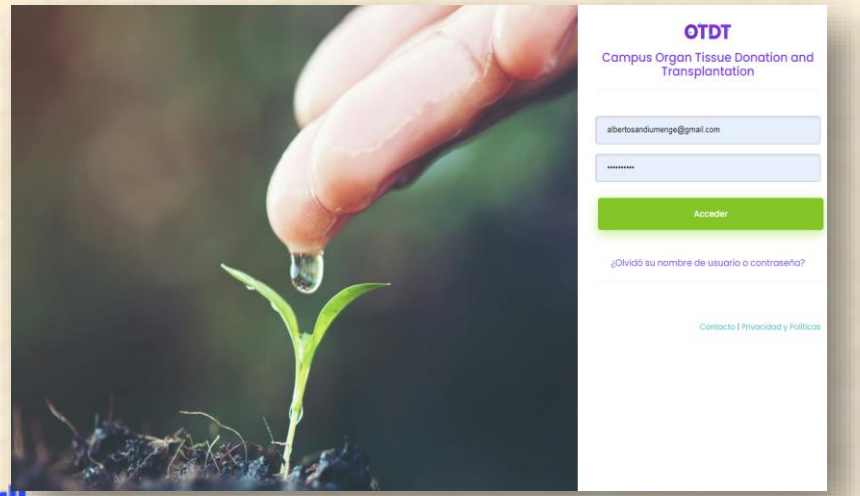
**Organs recovered from deceased donors may be used for transplantation in other jurisdictions, particularly in the absence of local transplant programs.*

TRAINING

https://www.donacionytrasplante.com/



https://campus.otdt.care/



Transplant International

ORIGINAL ARTICLE

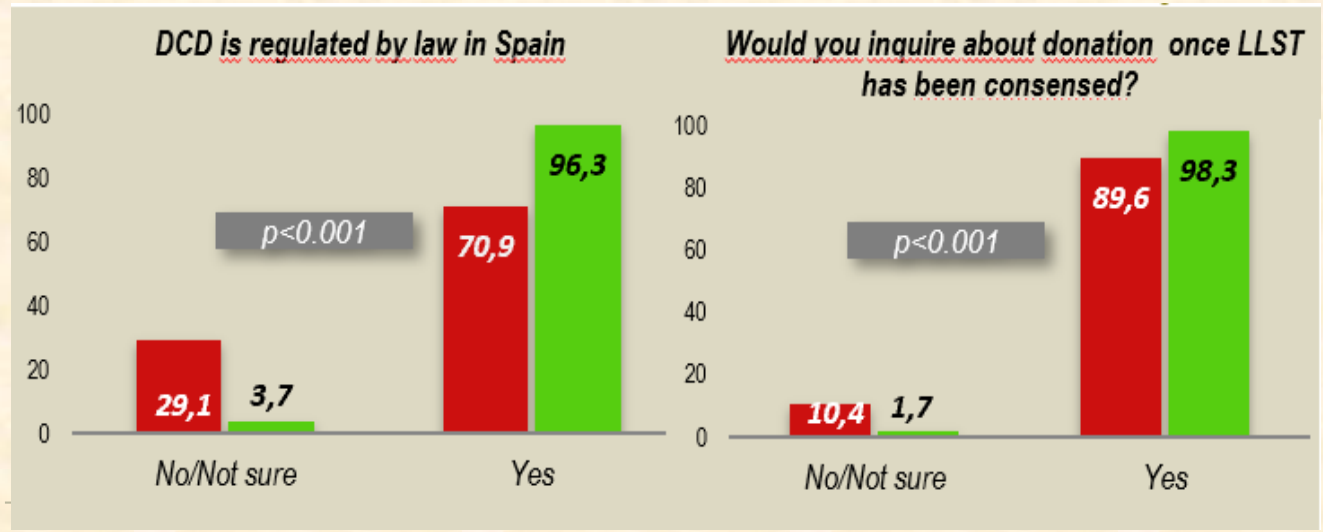
Online education about end-of-life care and the donation process after brain death and circulatory death. Can we influence perception and attitudes in critical care doctors? A prospective study

Alberto Sandiumenge[1], Maria del Mar Lomero Martinez[2], Jacinto Sánchez Ibáñez[3], Teresa Seoane Pillado[4], Xavier Montaña-Carreras[5], Juan-Domingo Molina-Gomez[5], Mireia Llauradó-Serra[6], Beatriz Dominguez-Gil[7], Nuria Masnou[8], Maria Bodi[9] & Teresa Pont[1]

A
Initial survey
840 (94.4%)

857 Enrolled

B
Final survey
650 (77.3%)



Transplant International 2020; 33: 1529–1540

Vall d'Hebron

Take home messages

- Intensivist managing donors should aim to increase organ availability and preserve long term graft function
- Meeting goals prior to organ recovery, even in expanded criteria donors, increases the number of transplanted organs
- High quality intensive care
- Proper experience and commitment
- DCD and perfusion strategies will increase organ availability and quality

TOO EARLY

'DEAD DONOR RULE'

Patients may only become donors after death, and the recovery of organs must not cause a donor's death

"I'm afraid the shark got your arms and legs. It's probably not a good time, but your brother's here. He needs a kidney."

TOO LATE

'TPM DONOR RULE'

To allow as many as possible deceased patients and their families to meet their wish to donate their organs after death

Ευχαριστώ πολύ !!