New Trends in Liver

Transplantation

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Disclosure

No conflict of interest in relationship to this program / presentation

My field of interest in transplant surgery – decision analysis

Dr Tevar

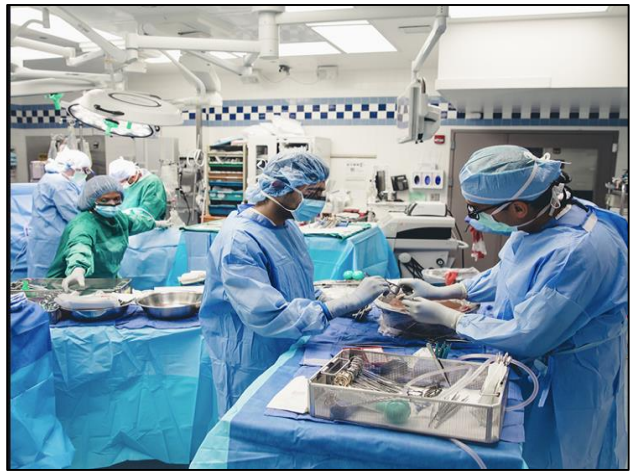
Liver transplantation

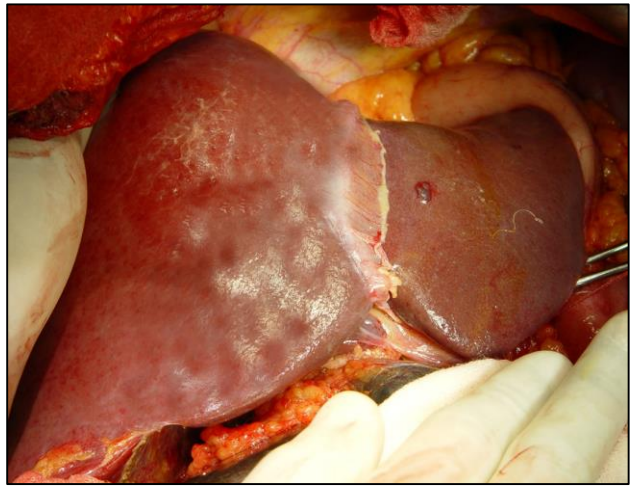
Before

Before

After

Liver transplantation





Did I chose the right organ for this patient?
Will I have any “surprise” during the operation>?
Will the patient make it trough the operation?
Will the patient be able to recover?

Current trends in Liver Transplantation

- Advances in antiviral medications (HCV, HBV, HIV) and survival
- The role of live donation
- Geographical disparities in access to liver transplantation
- Split liver transplantation
- Combined liver transplantation and gastric sleeve resection
- The role of simultaneous liver and kidney transplantation
- New allocation systems
- Role of liver transplantation for cholangiocarcinoma, colorectal metastases

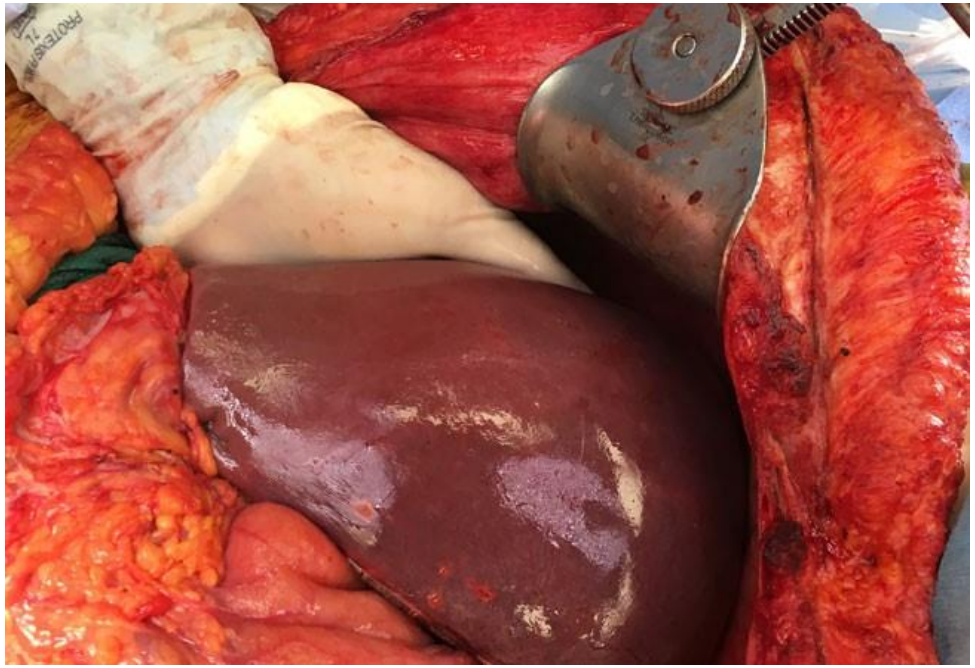
10% of liver transplant recipients die within the first 1 after surgery

Current Trends in Liver Transplantation

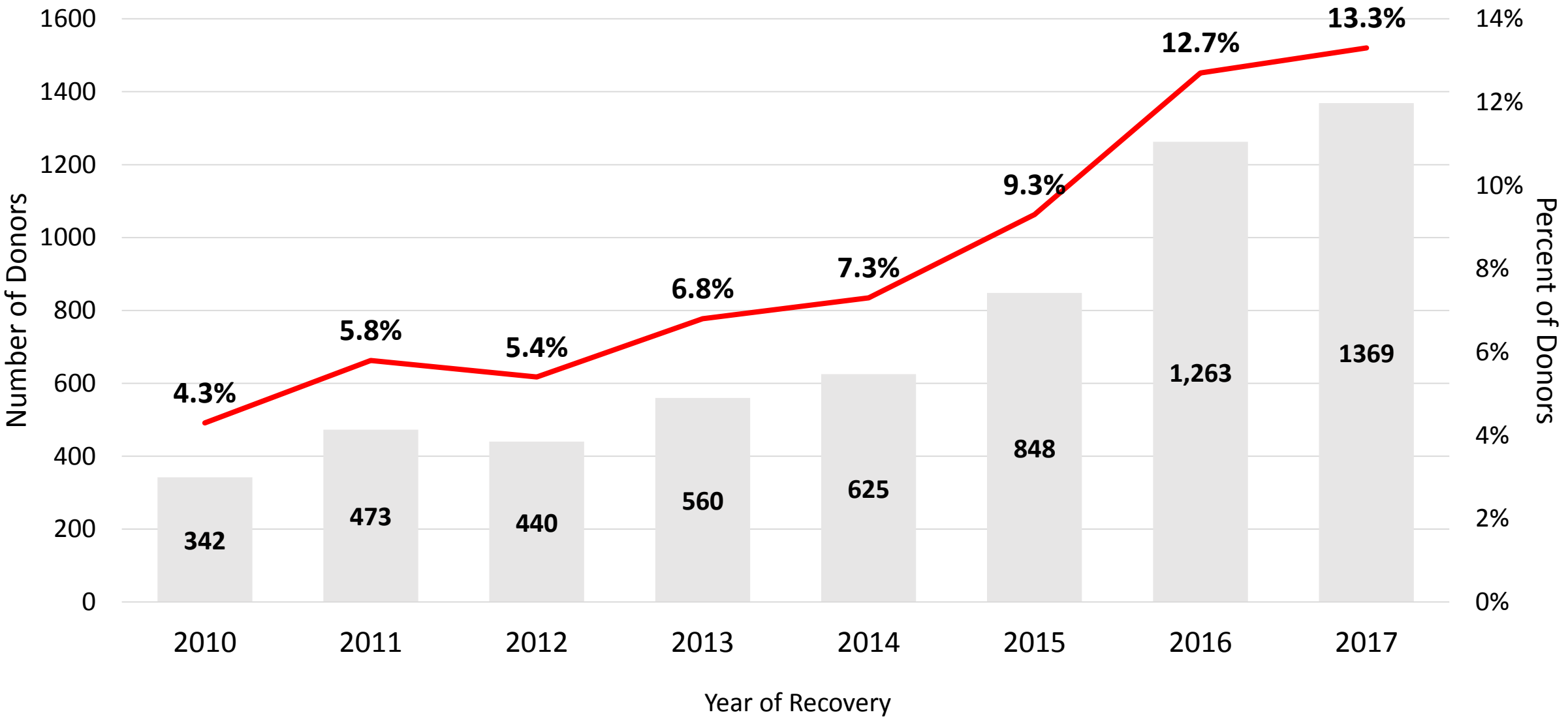
- **Donors**
  - Type of death (Brain dead vs. death after cardiovascular arrest)
  - Age
  - Comorbidities

- **Recipients**
  - Indications
  - Age
  - Comorbidities
  - Operative risk profile

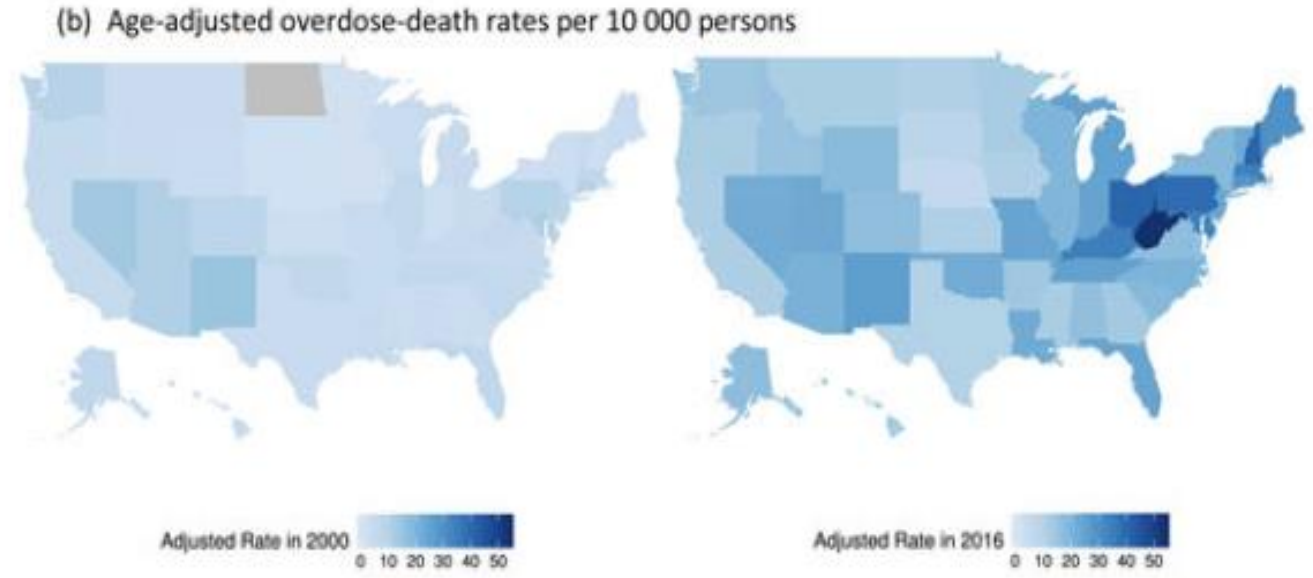
Donors



Deceased Donors Recovered in the U.S. between 2010-2017 with **Drug Intoxication** Reported as Mechanism of Death



Overdose death donors

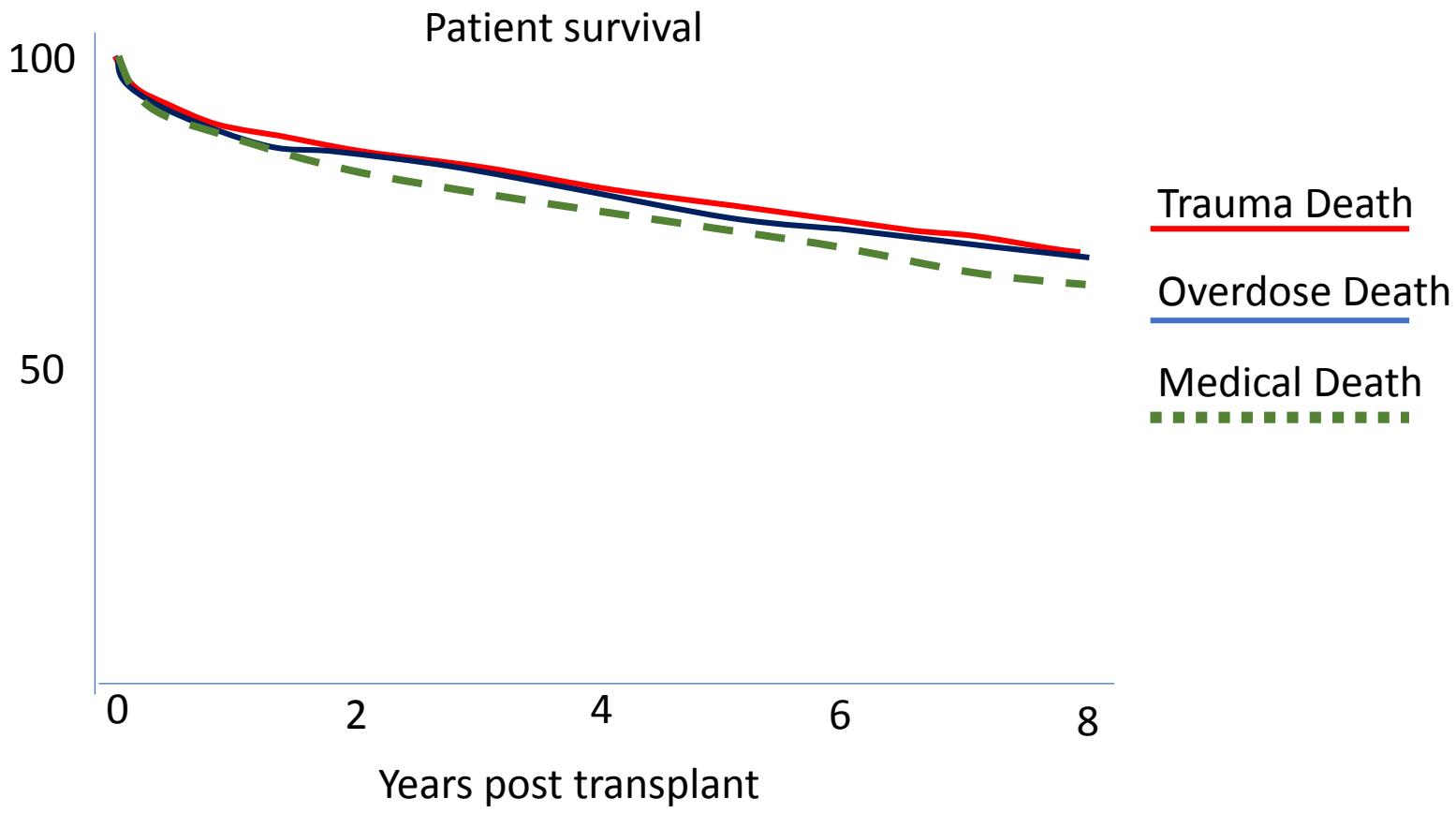


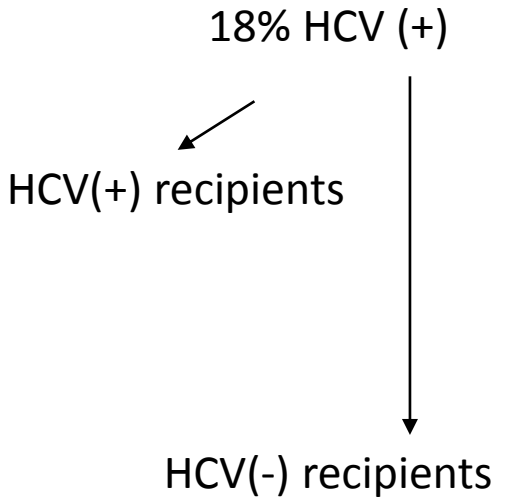
Age-adjusted overdose-death rates per 100,000 people.

- Age 20-40 years ~65%
- HCV (+) ~20%

- Polysubstance abuse ~90%

Drug overdose epidemic



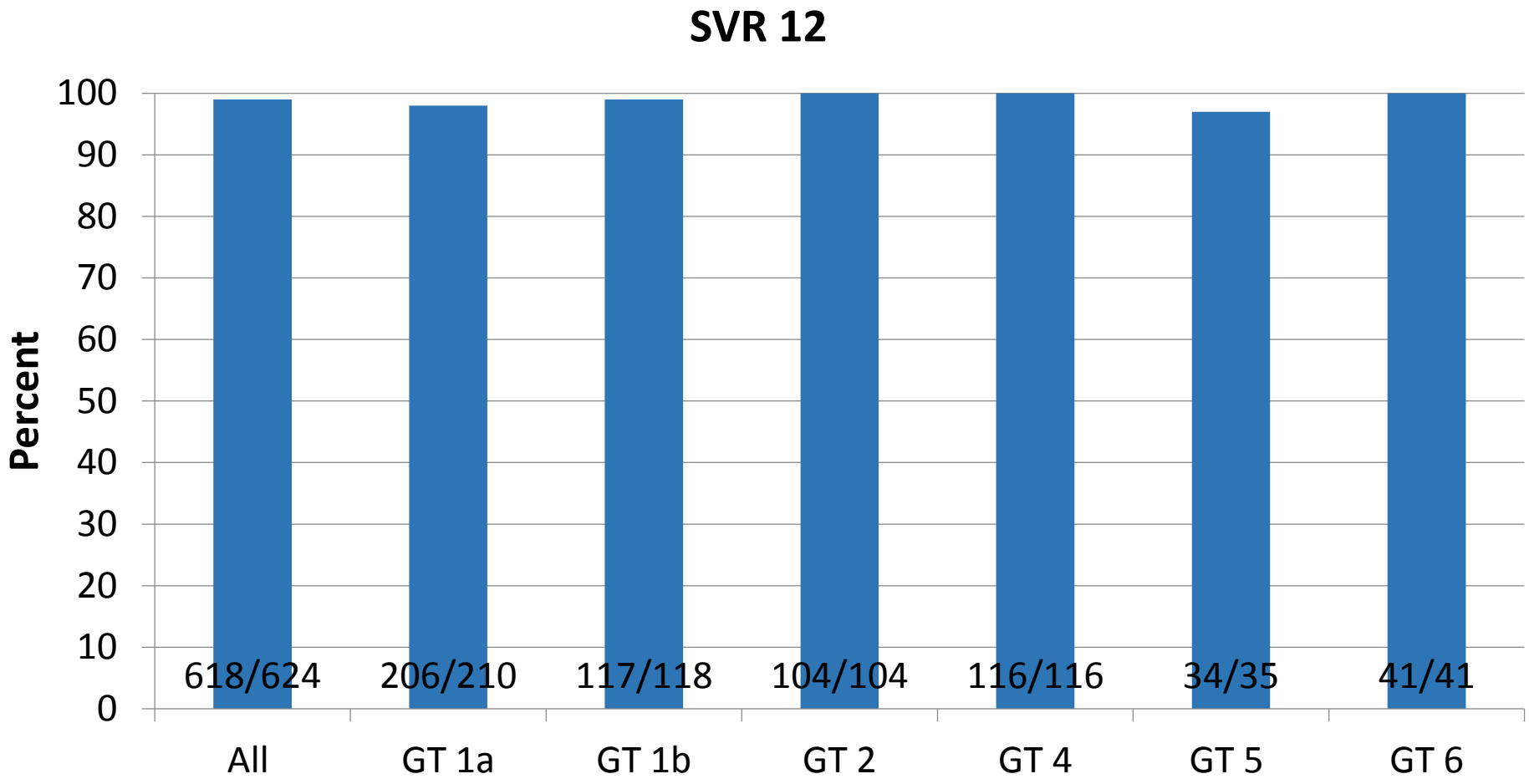


Treatable

Direct Acting Anti-hepatitis C Virus Drugs

Durand et al. Ann Intern Med 2018

Epclusa (Sofosbuvir/Velpatasvir) x 12 weeks,



ASTRAL-1: *Feld JJ, NEJM, 2015; 373: 2599*

Should we Use HCV(+) grafts for HCV(-) recipients?

TABLE 1. Advantages and Disadvantages of Utilizing HCV-Positive Donors for HCV-Negative Recipients

Advantage	Disadvantage
- Increase pool of currently available donors	- 100% risk of transmission of HCV for recipients
- Decrease wait-time mortality for very sick recipients (FHF, high MELD >30)	- High cost of DAA
	- Limited access to DAA regimens
- Potentially younger donors without other comorbidities	- Requirement for preapproval by drug companies or insurance companies*
- DAA regimens have a very high rate of cure	- Possible interaction between DAA regimens and immunosuppression
- Similar longterm graft and patient outcome than HCV-negative donors	- Ethical/society barrier
	*only for countries where insurance companies cover the costs

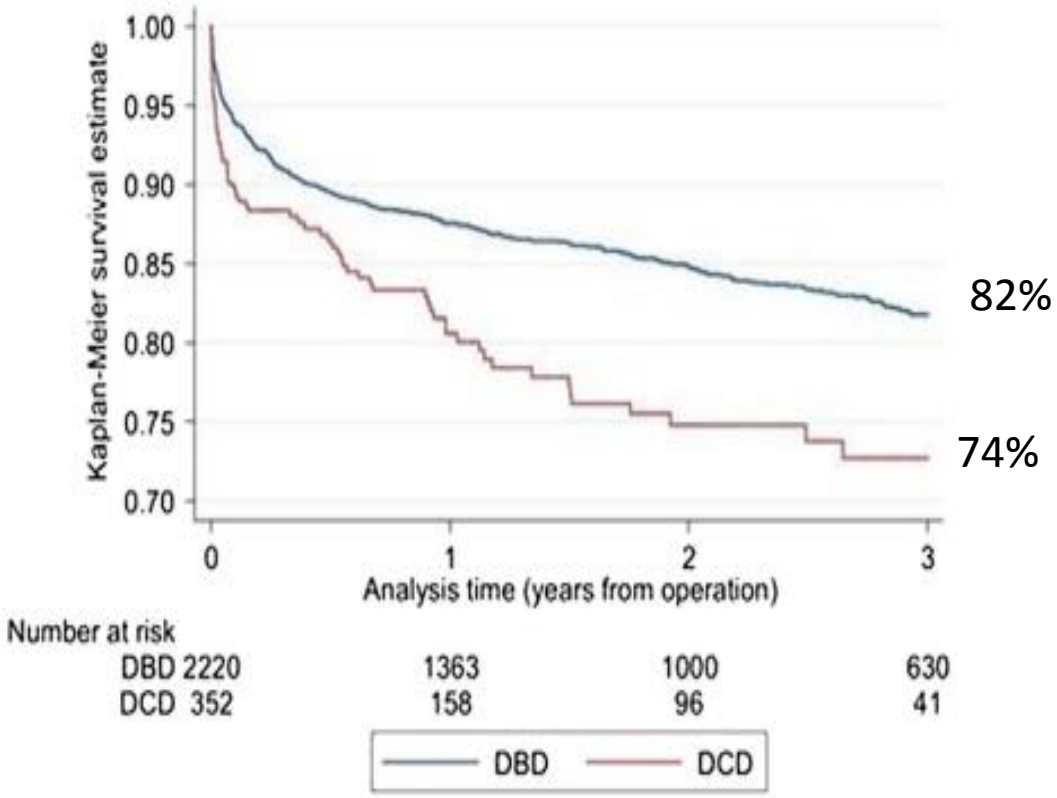
Should I accept a liver donated after cardiac death?

DCD Liver Utilization in the U.S. 2008 – 2015

Source: Based on OPTN data through December 31, 2015

DCD vs DBD liver grafts: UK experience

Figure 1 Graft survival after first elective adult liver transplantation using livers from donation after circulatory death (DCD) donors and donation after brain death (DBD) donors.



82%

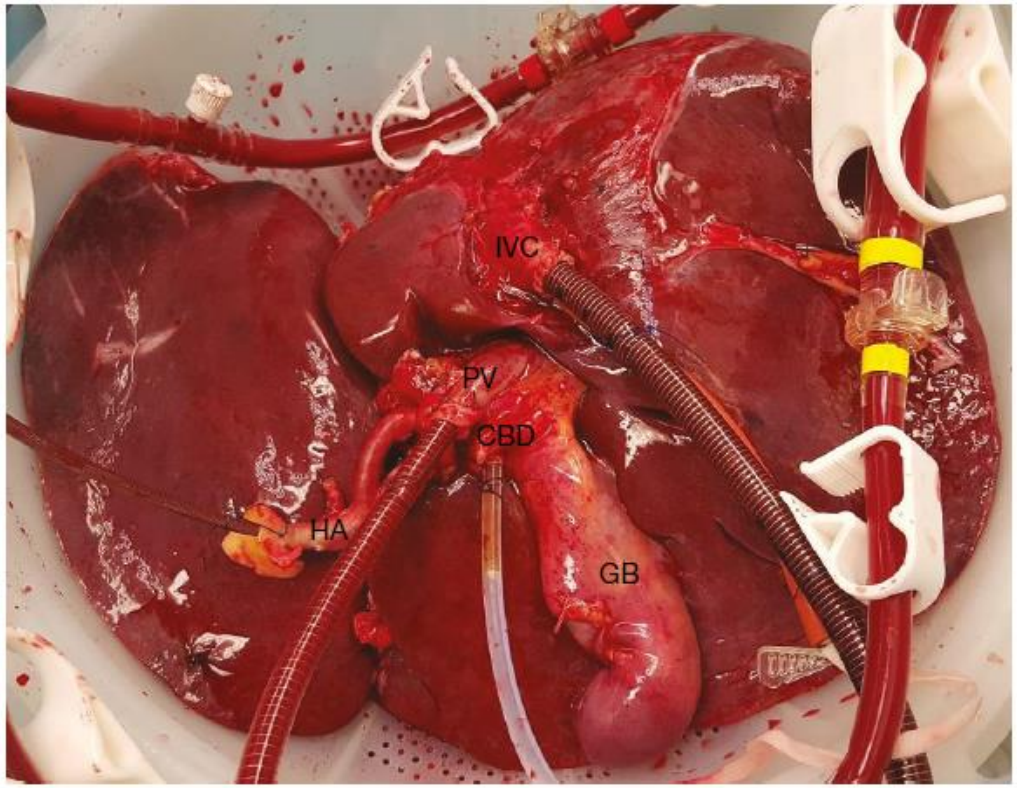
74%

Suboptimal perfusion (Warm ischemia time)

- Tissue inflammation
- Increased risk of vascular thrombosis
- Increased risk of biliary injury
- Increased risk of primary graft non-function
- Increased risk of graft loss

Callaghan et al. BMJ 2013

Liver perfusion before transplantation

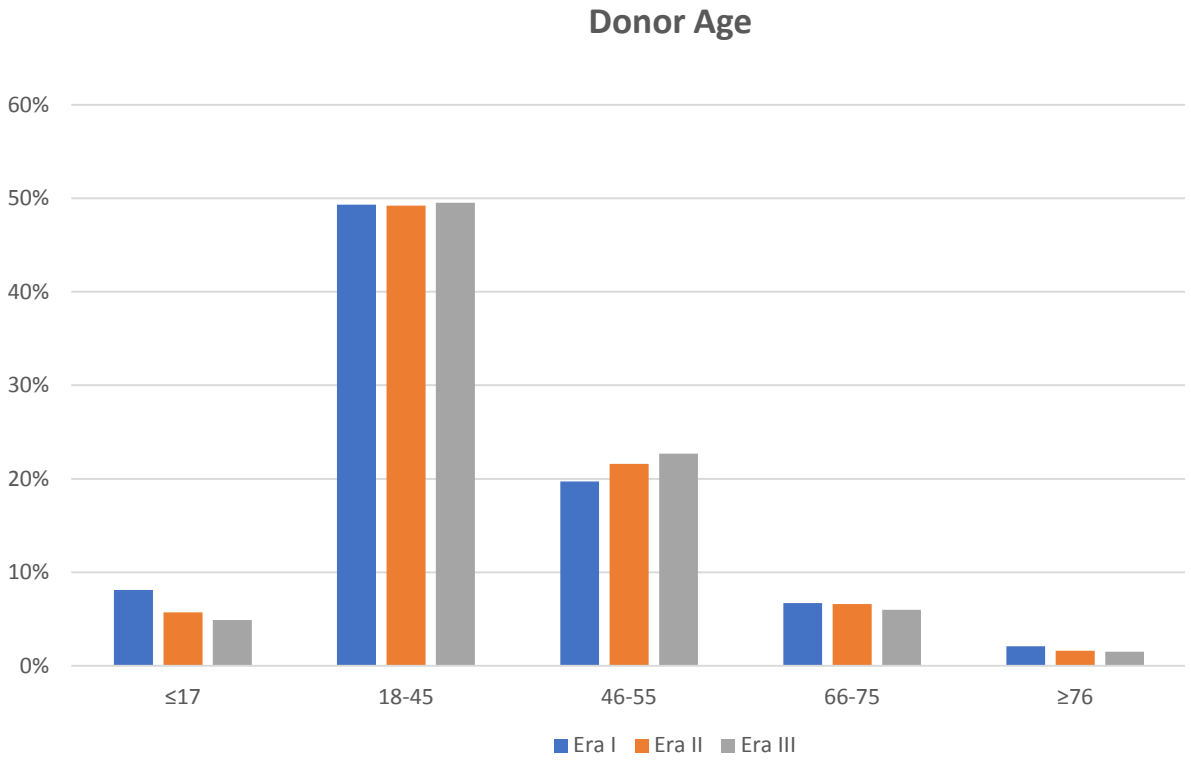


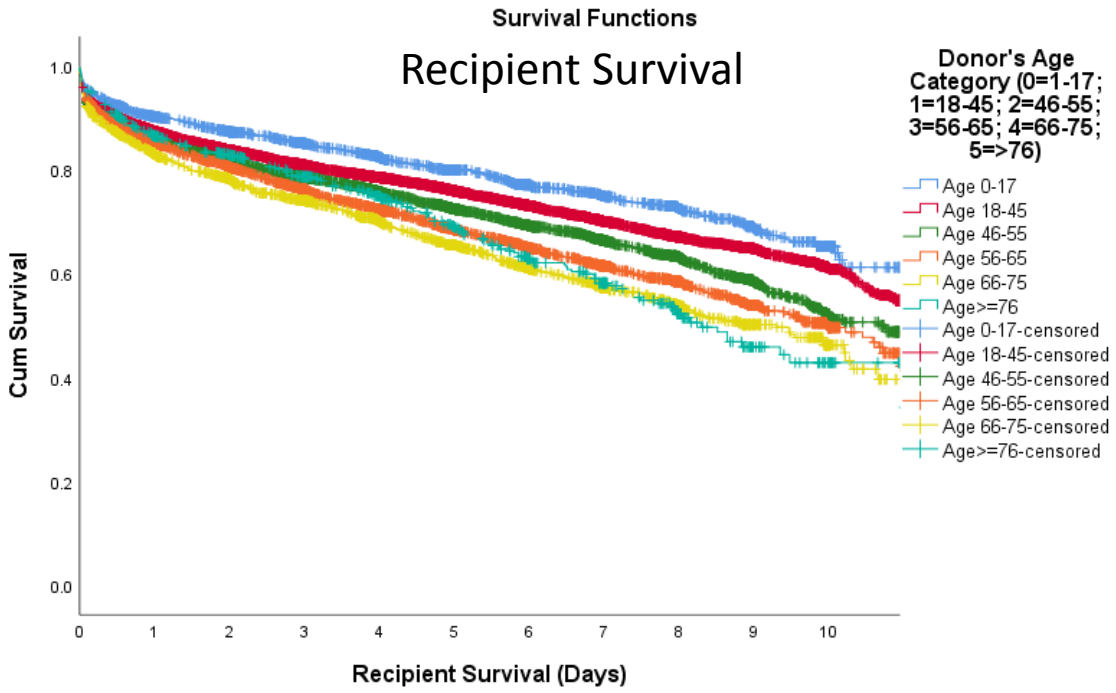
preconditioning

Hypothermic perfusion

Normothermic perfusion

Donors Age: SRTR Data 2002-2017





ERA I = 2002-2006

ERA II = 2007-2011

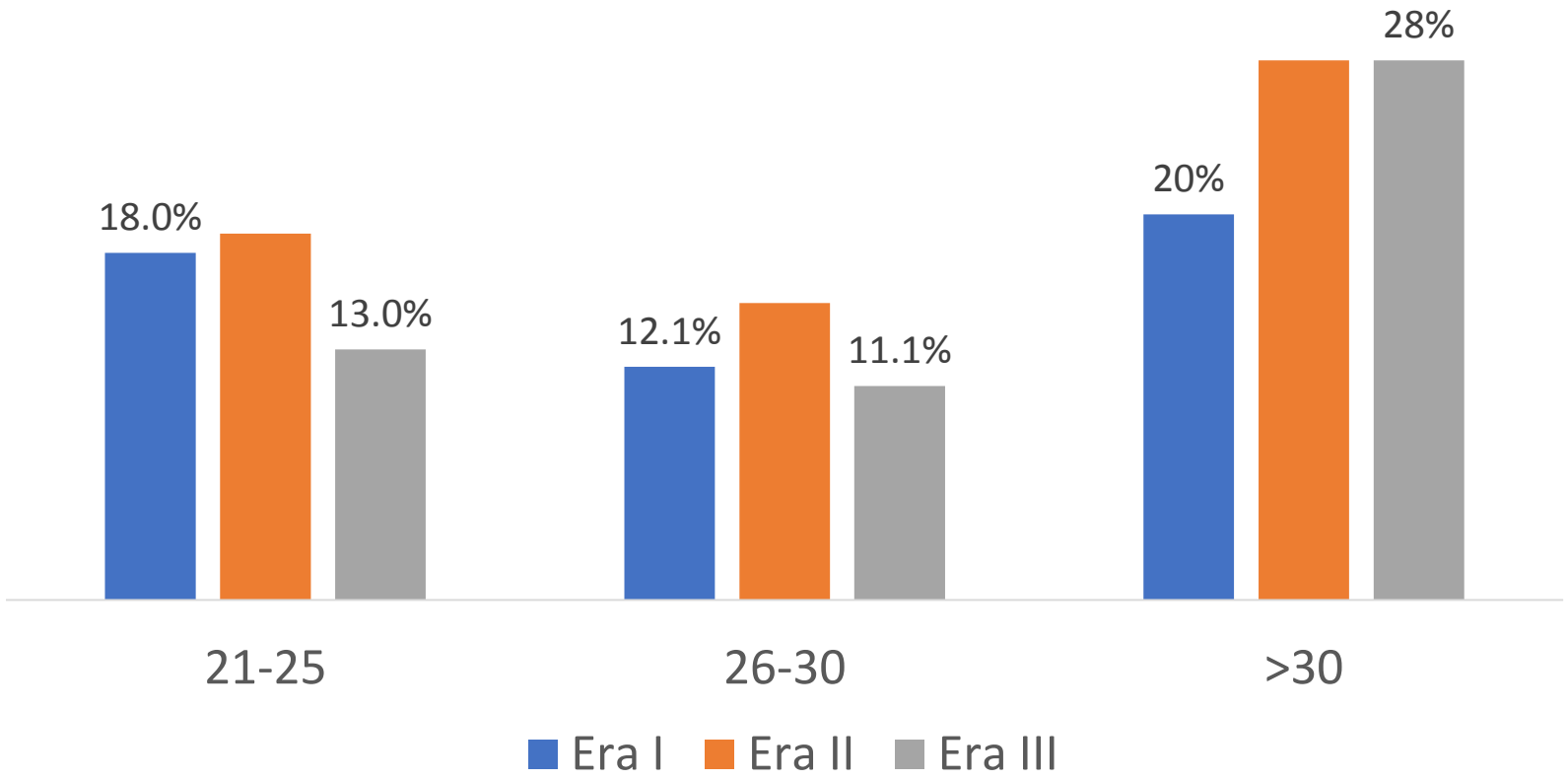
ERA III = 2012-2017

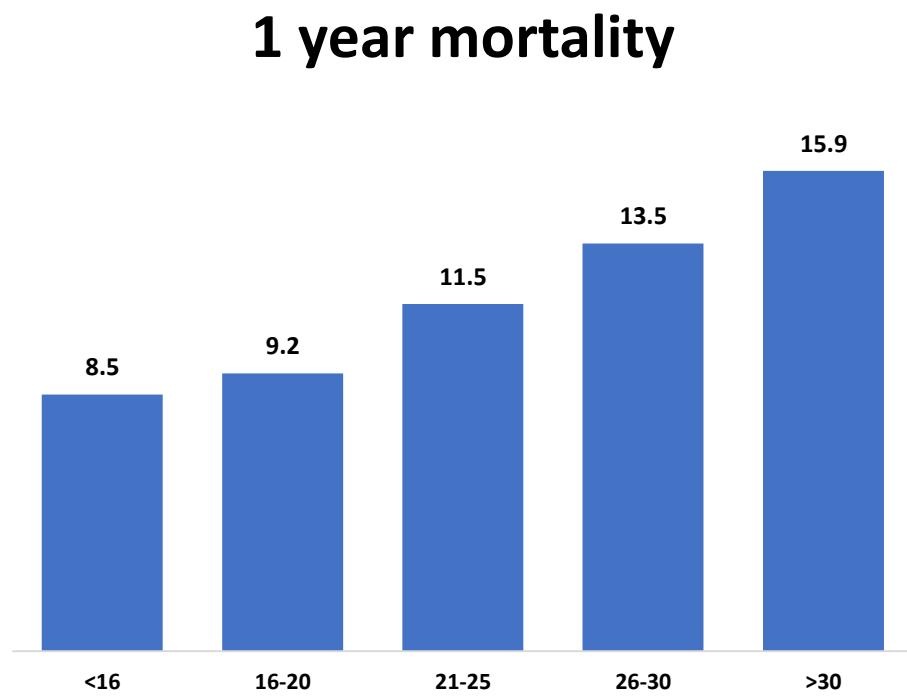
Recipients

MELD Score

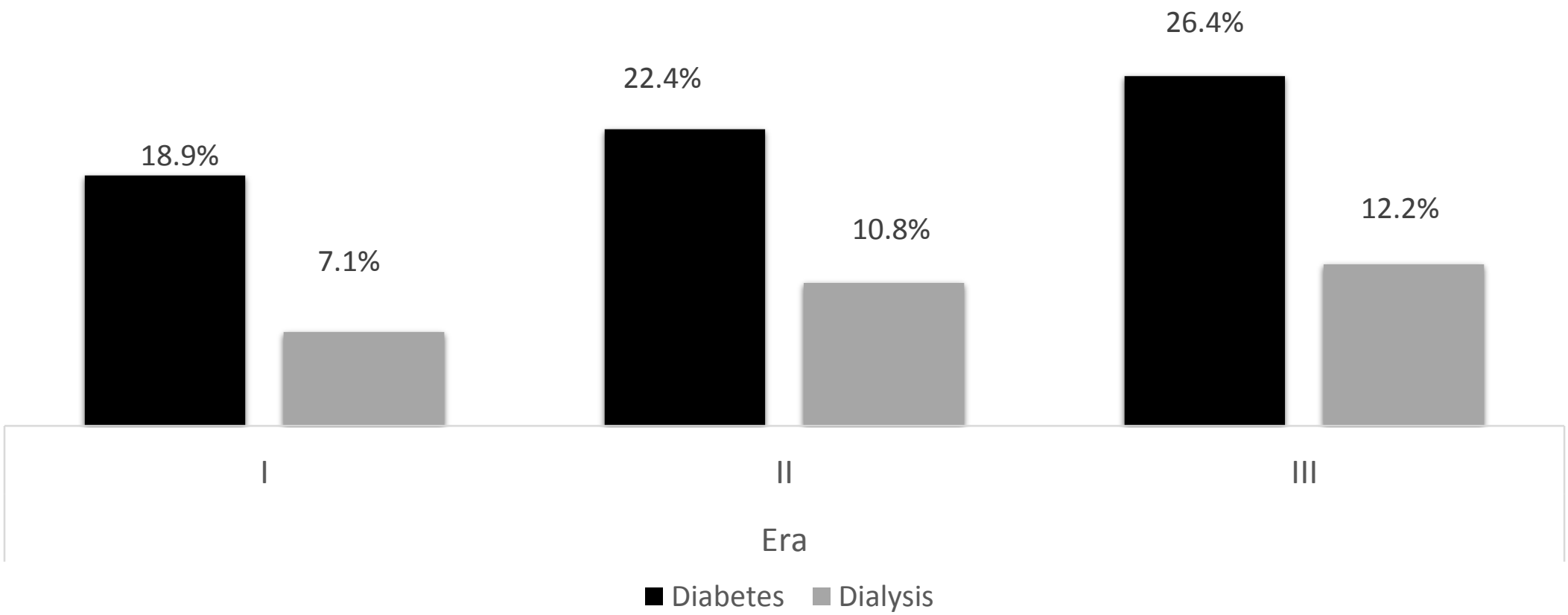
- In 2002 the MELD score was introduced for organ allocation

Trends in MELD at Transplantation





Comorbidities



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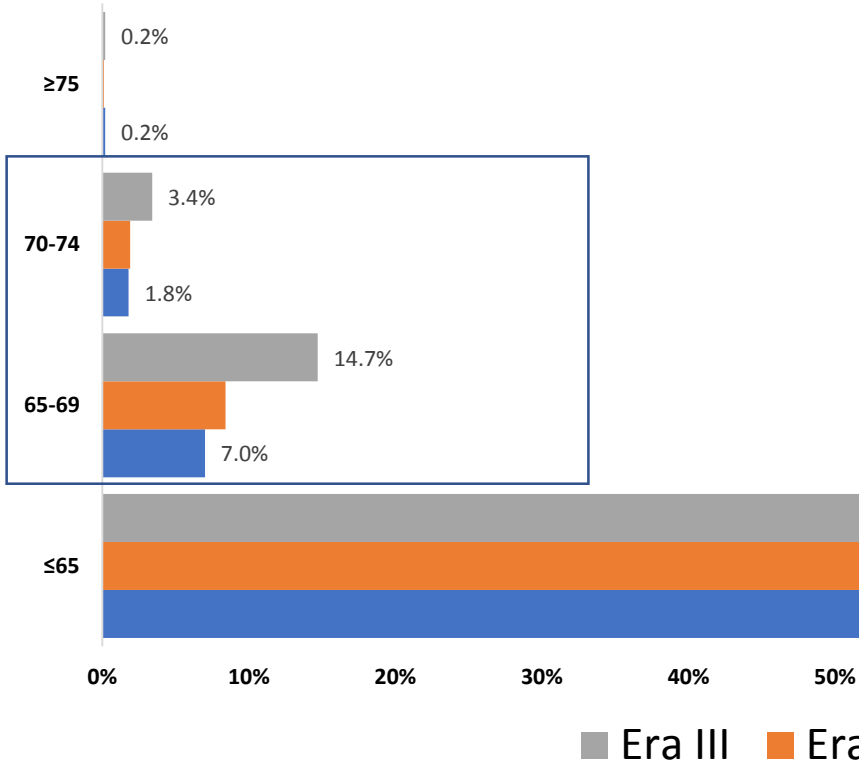
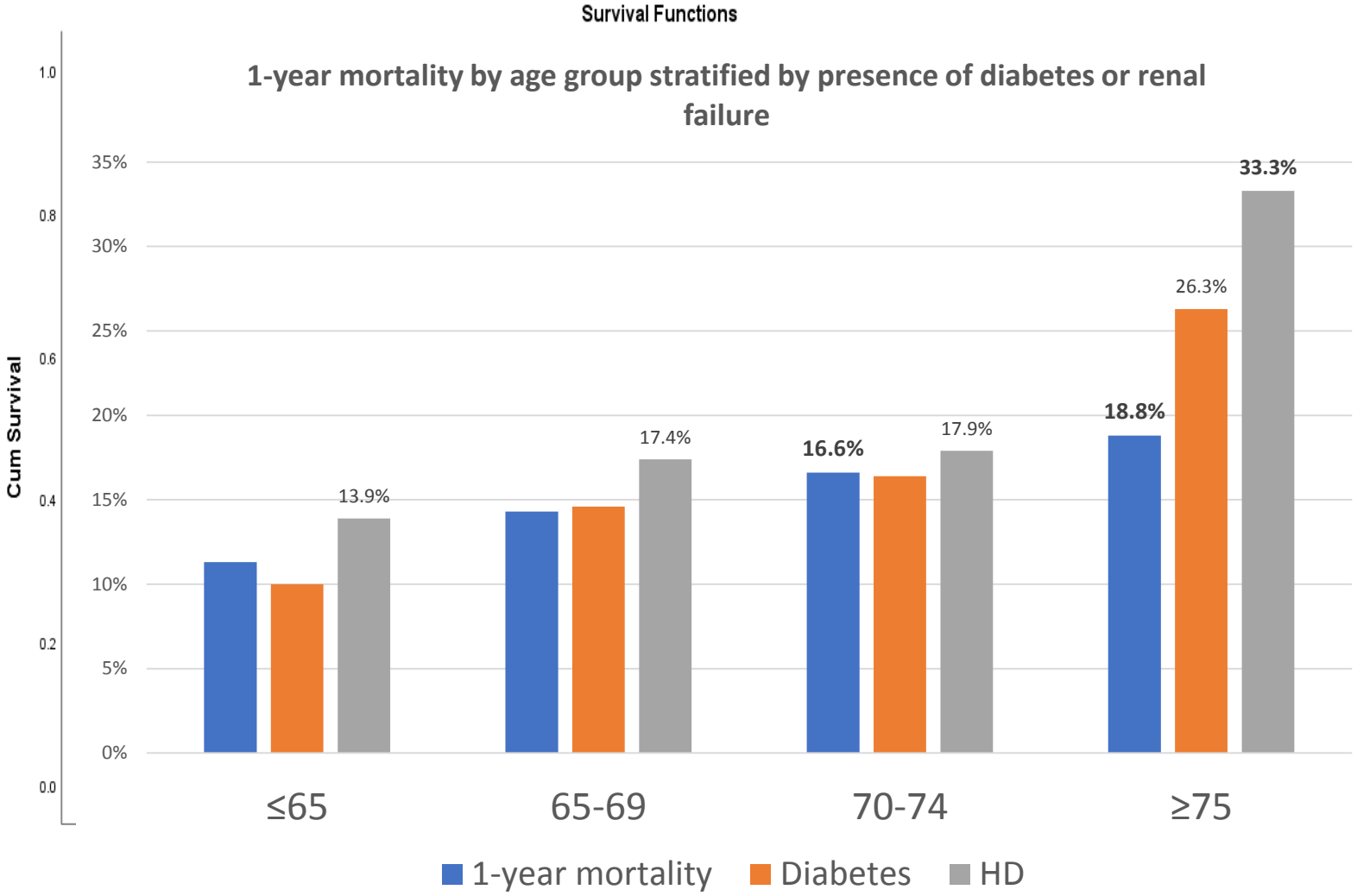
Recipier

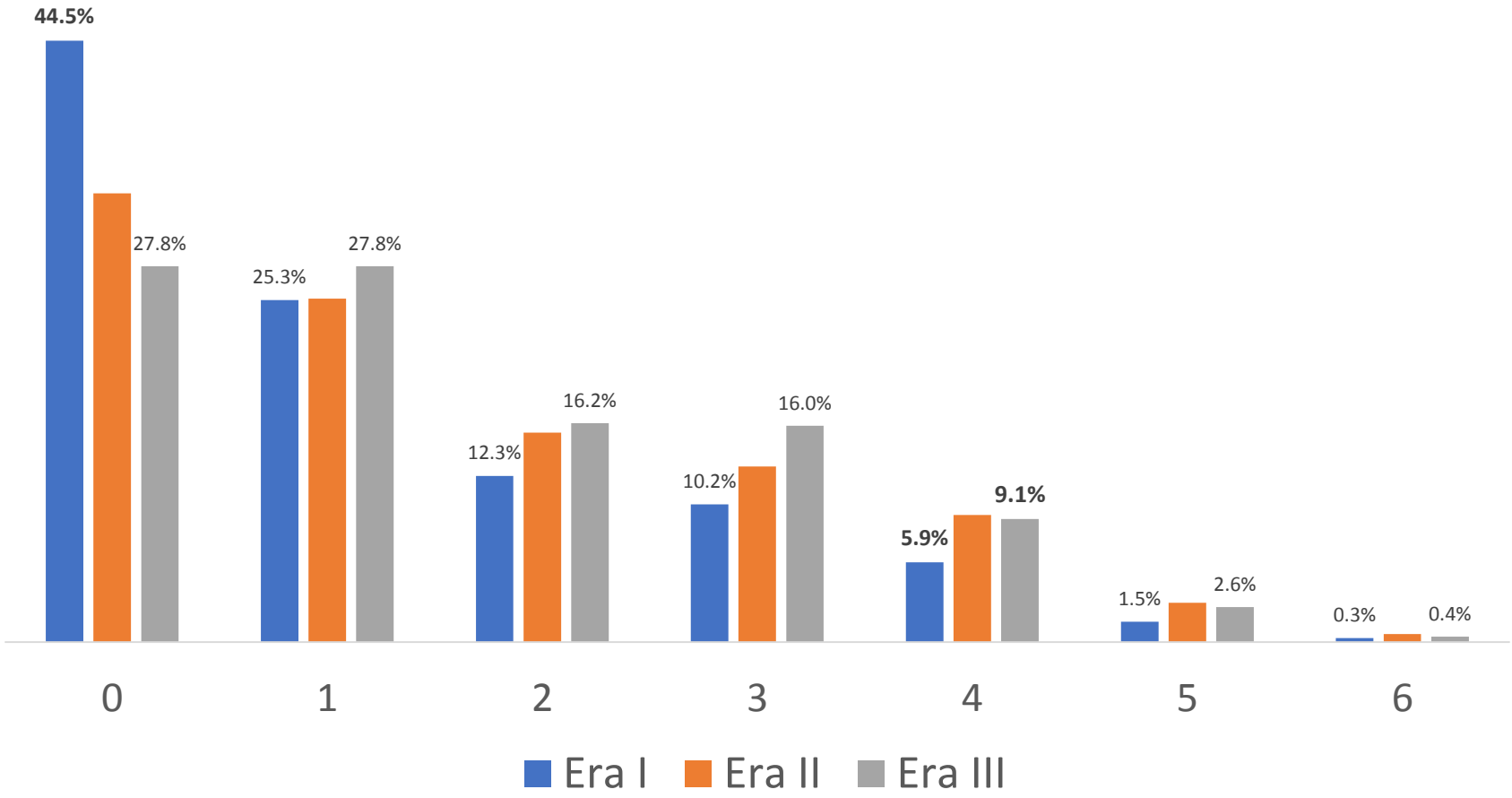

0.2%
≥75
0.2%
3.4%
70-74
1.8%
14.7%
65-69
7.0%
≤65
0%
10%
20%
30%
40%
50%
Era III
Era

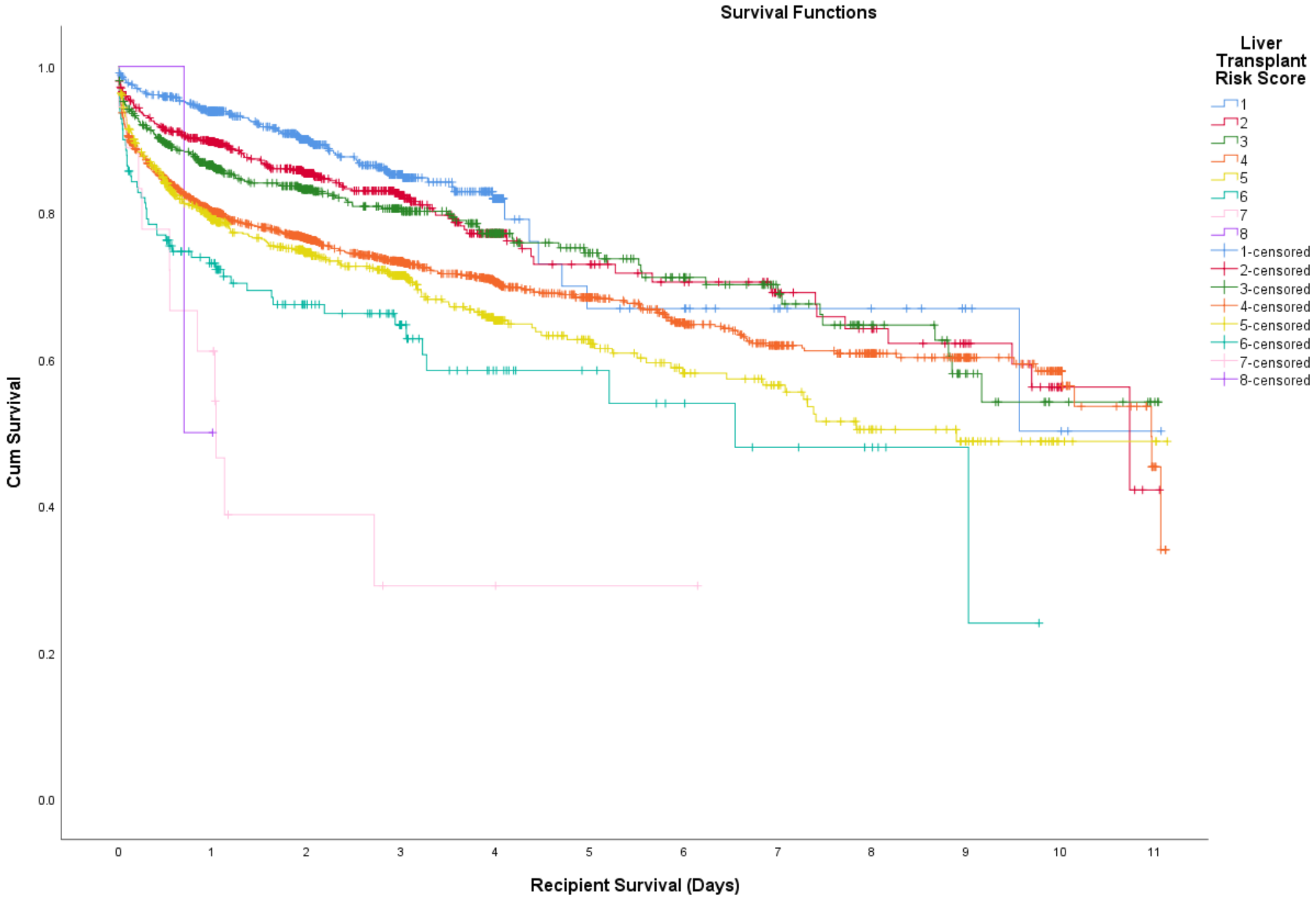

Survival Functions
1-year mortality by age group stratified by presence of diabetes or renal failure
Cum Survival
1.0
0.8
0.6
0.4
0.2
0.0
35%
30%
25%
20%
15%
10%
5%
0%
13.9%
17.4%
16.6%
17.9%
18.8%
26.3%
33.3%
≤65
65-69
70-74
≥75
1-year mortality
Diabetes
HD

Can we improve our abilities to identify high-risk patients?

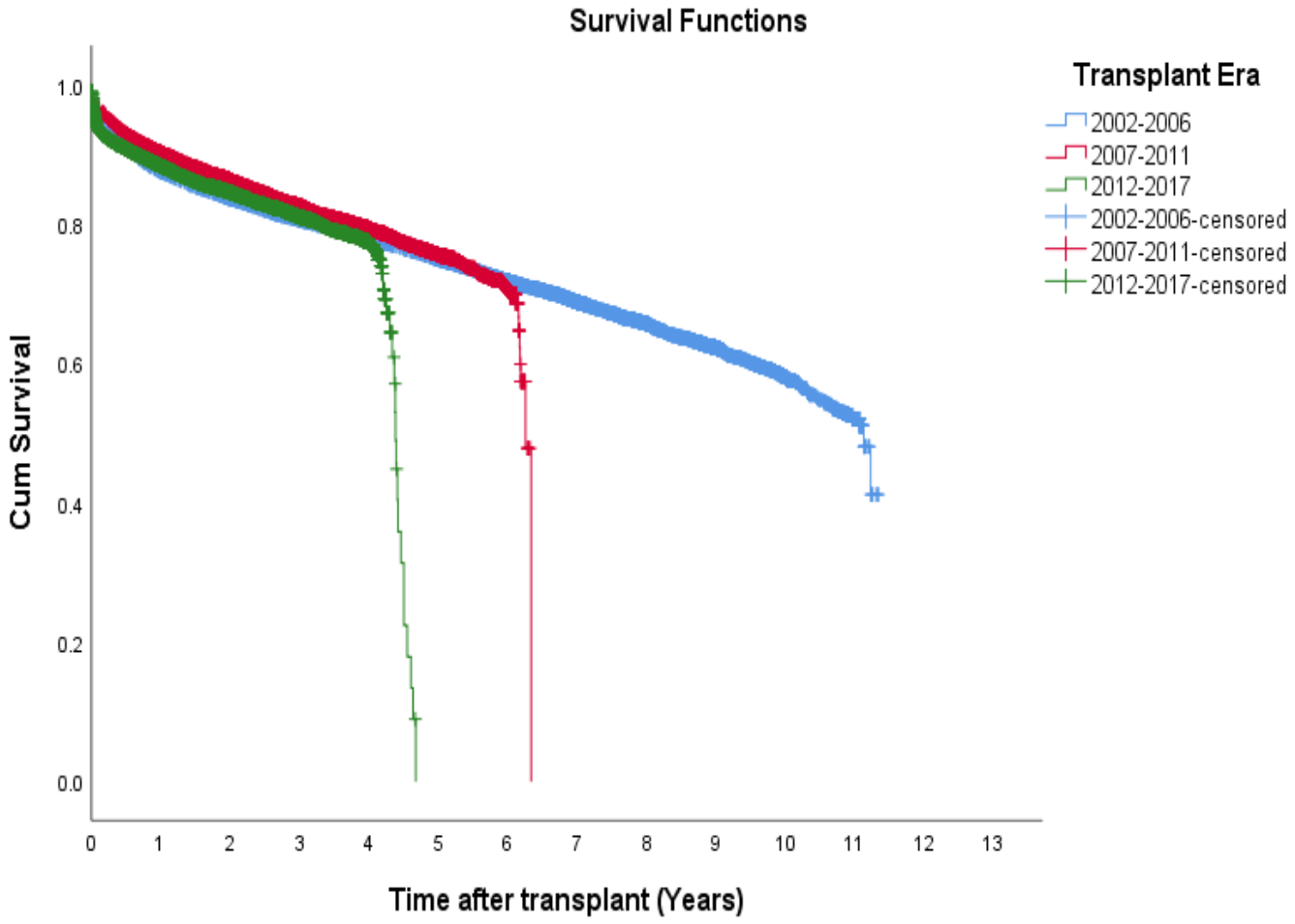
Liver Transplant Risk Score

Characteristic	Group	Point
Age	<65	0
	65-69	1
	70-74	2
	≥75	3
MELD Score	<25	0
	25-29	1
	30-34	2
	≥35	3
BMI	≤18.5	1
	18.5-39.9	0
	≥40	1
Metabolic	Diabetes	1
	Dialysis	1




Survival Functions
Liver Transplant Risk Score
1
2
3
4
5
6
7
8
1-censored
2-censored
3-censored
4-censored
5-censored
6-censored
7-censored
8-censored
Cum Survival
1.0
0.8
0.6
0.4
0.2
0.0
0
1
2
3
4
5
6
7
8
9
10
11
Recipient Survival (Days)

Patient survival



- **Improved pre-transplant management**
  - Rehabilitation
  - Physiotherapy / Frailty
  - Nutrition
  - Interventions (TIPPS / Banding)

- **Intraoperative management**
  - Piggyback transplants
  - Venous-venous by pass
  - Management of coagulopathy

- **Postoperative management**
  - Infectious disease
  - Metabolic disorders
  - Preventive interventions (e.g. substance abuse)
  - Physiotherapy
  - Nutritional support

Conclusions

- There have been many changes in donor and recipient characteristics
- Risk index for donor and recipient
- Progressive refinement of the management of liver transplant recipients (before, during, after surgery)
- More complex recipients are transplanted (e.g age / comorbidities)
    - Increased health-care resource utilization
- Close monitoring of selection / outcomes is needed as patient survival has not improved over the last 2 decades