

Have changes in the utilisation of livers donated following circulatory death affected survival in patients undergoing liver transplantation for hepatocellular carcinoma?

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Background

- The incidence of hepatocellular carcinoma (HCC) continues to increase.
- Pressure to transplant patients with HCC before disease progresses.
- Increased utilisation of donors following cardiac death (DCD) in patients with HCC.
- In this study, we assess how liver transplantation for patients with HCC has changed over time.
 - Split cohort into separate 'eras of transplantation' and ...
 1. Compare the use of liver transplantation over different eras.
 2. Compare the outcomes of liver transplantation over different eras.

Comparison of outcomes in sequential era

Changes over time in the selection of patients with HCC for liver transplantation

Introduction of Milan
Criteria 1996

Adoption of expanded
criteria in UK 2008

Relative Risk (RR)
 $\leq 1 \geq$

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 $\leq 1 \geq$

Relative Risk (RR)
 $\leq 1 \geq$

Era 1: 1997-2001

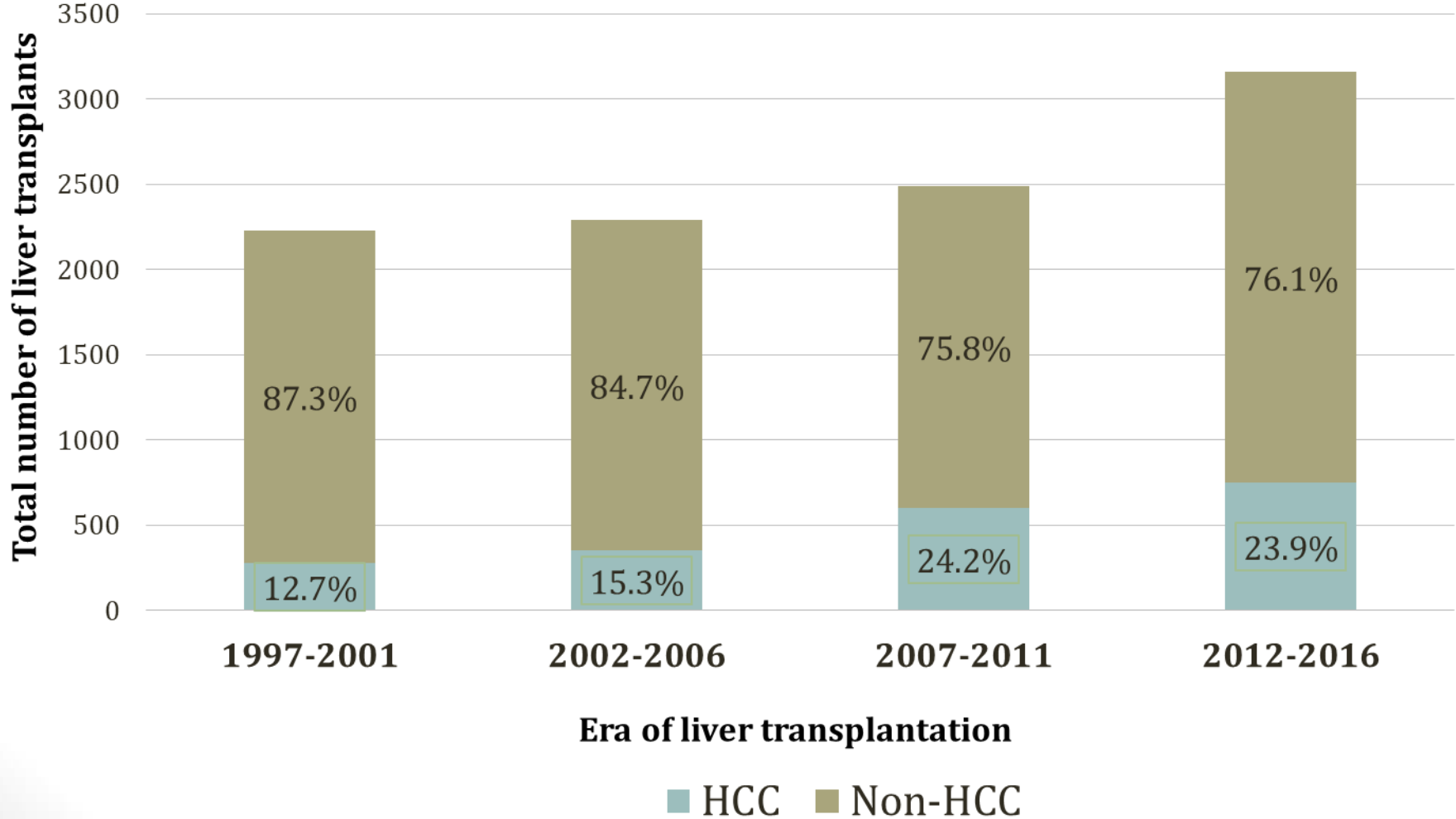
Era 2: 2002-2006

Era 3: 2007-2011

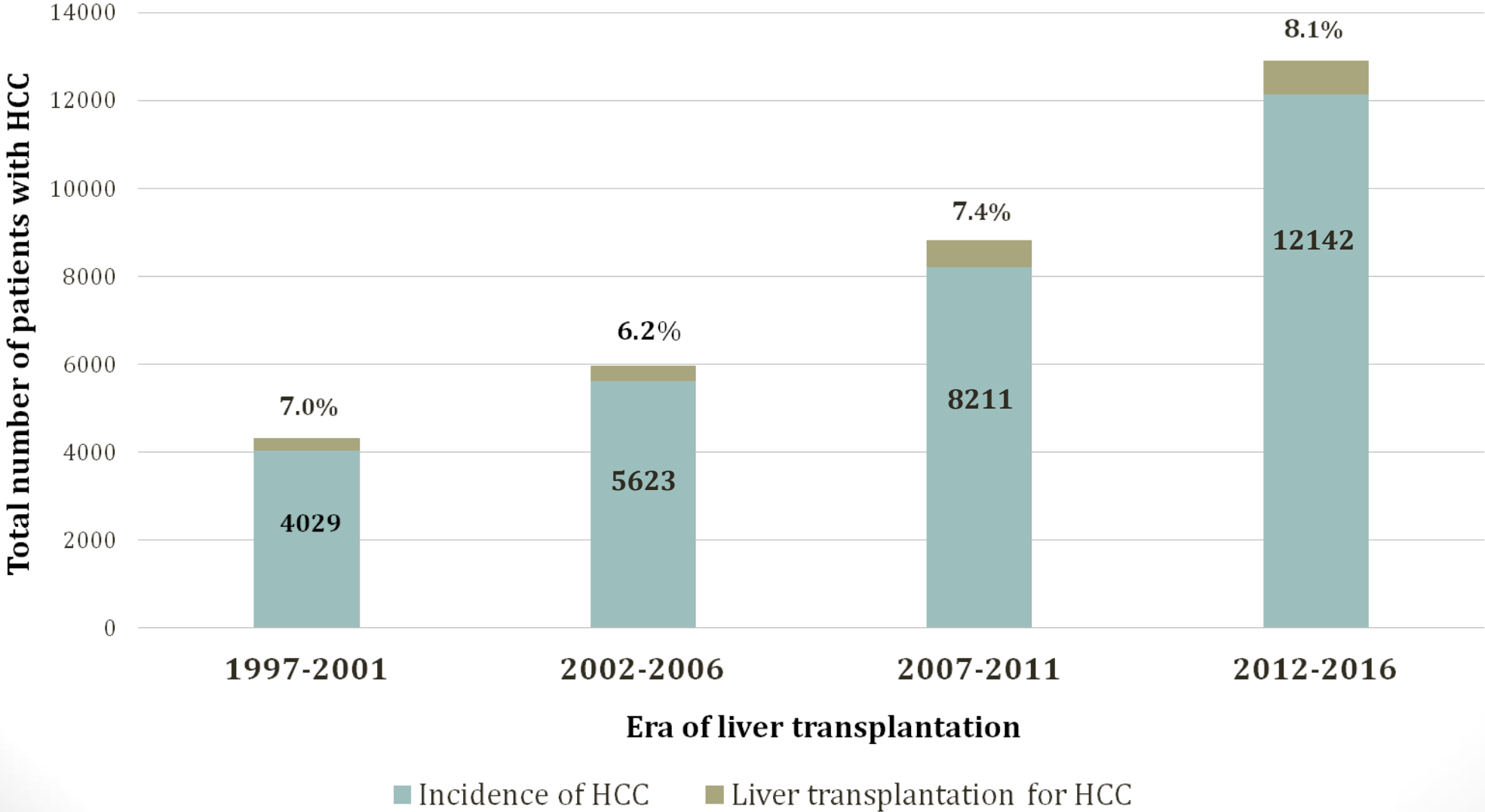
Era 4: 2012-2017
(incomplete 5-year
follow-up)

Liver transplantation and HCC

10,166 recipients

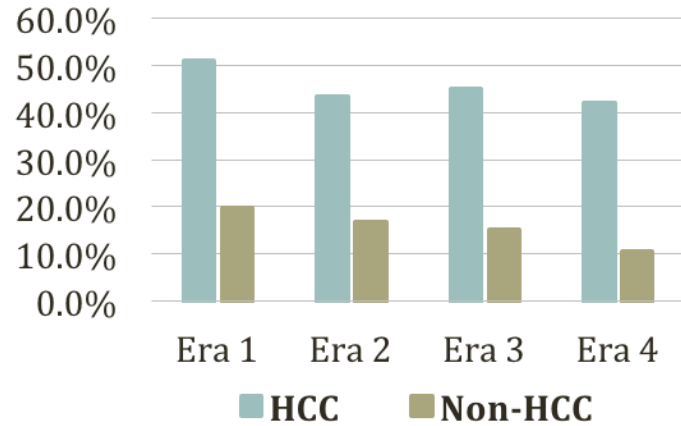


HCC and Liver transplantation

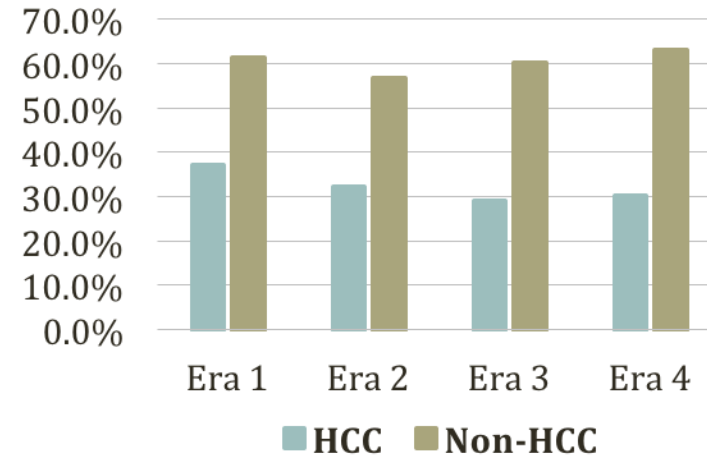


Era specific changes in recipient characteristics 1997-2016

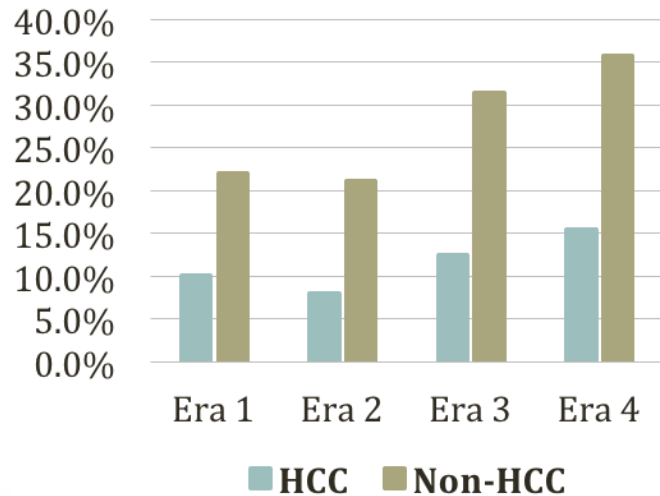
Presence of hepatitis C



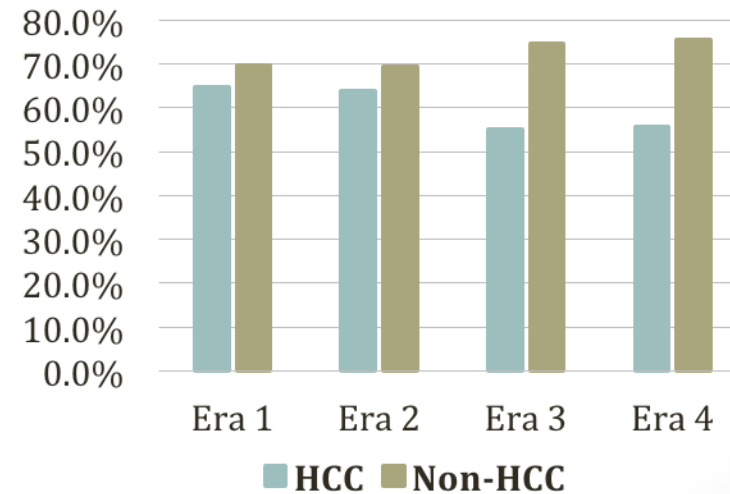
Presence of ascites



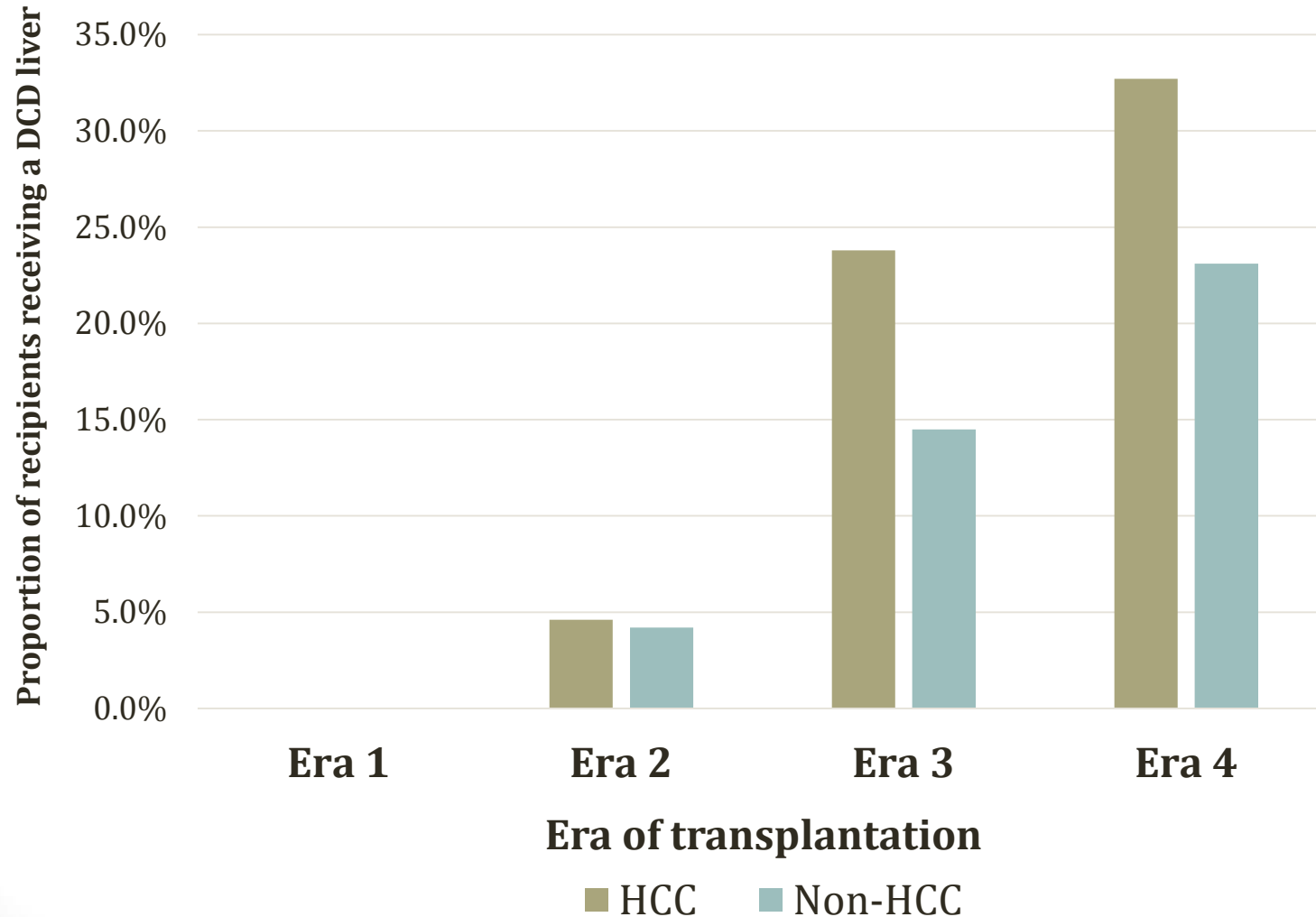
Presence of encephalopathy



Presence of varices



Era specific change in DCD utilisation 1997-2016



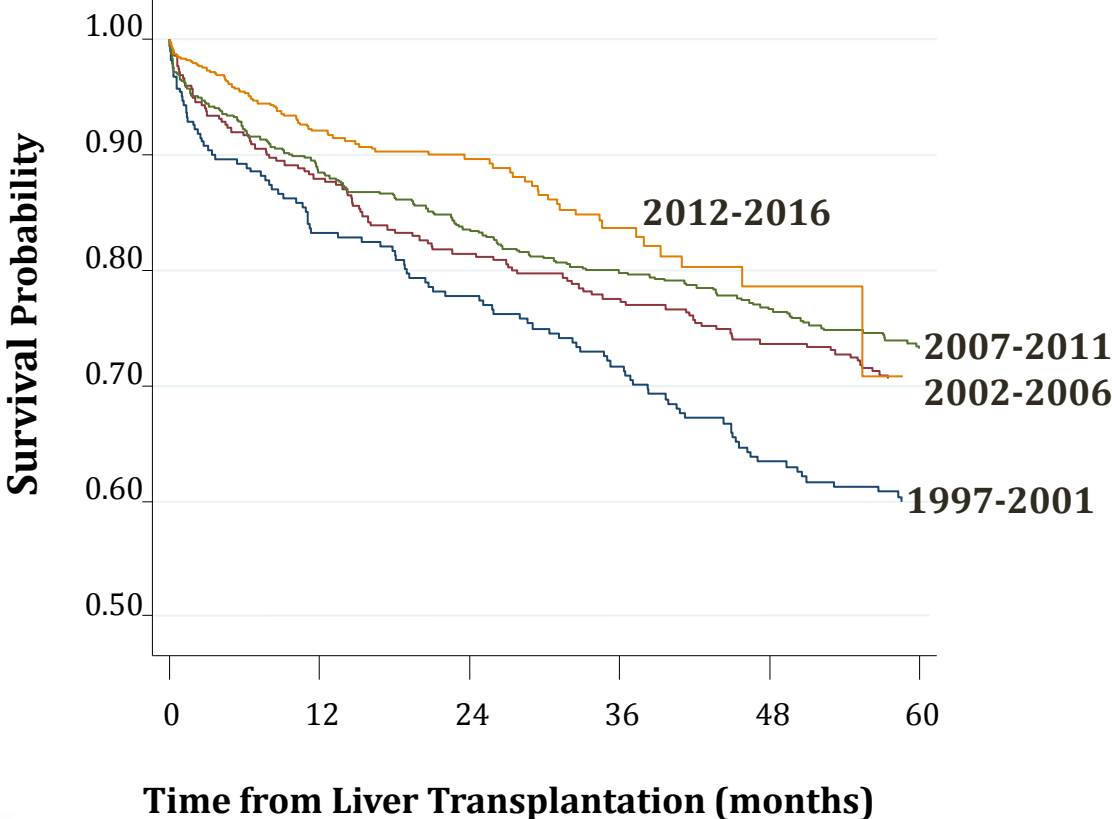
Exponential increase in DCD utilisation.

Era 4:
HCC = 33% of all liver transplants

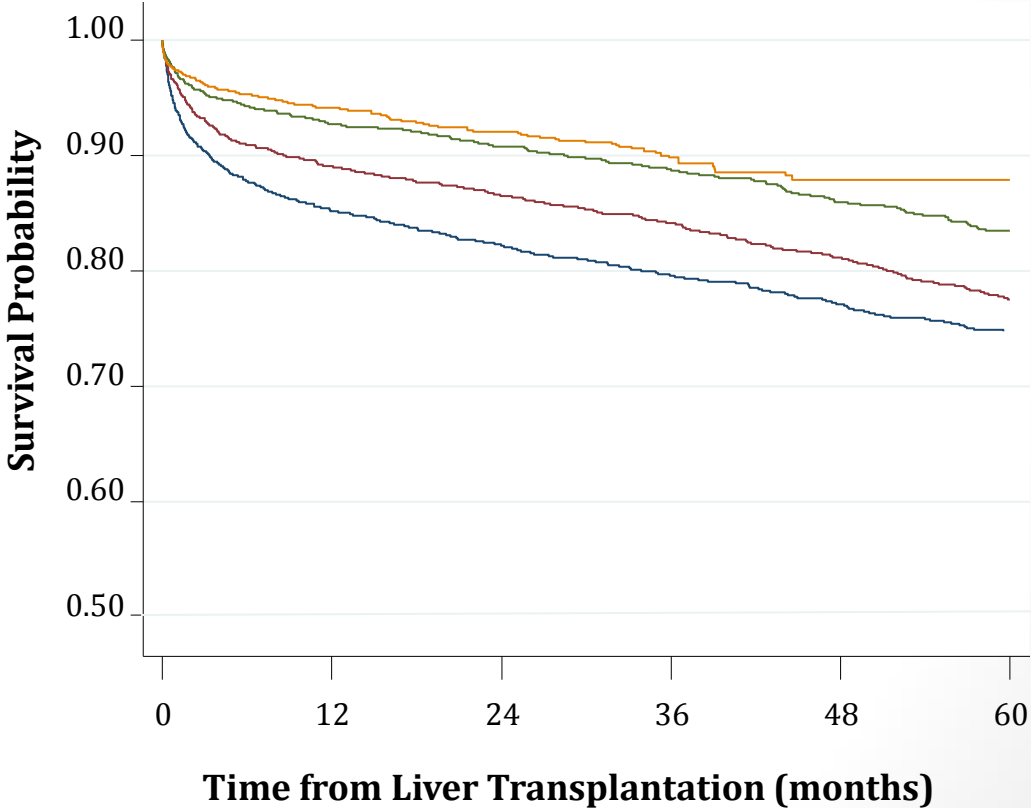
Non-HCC = 25% of all liver transplants

Era specific change in 5-year patient survival

HCC recipients (n=1990)



Non-HCC recipients (n=8176)



Comparison of 5-year patient survival across era



	Era 2 vs Era 1	Era 3 vs Era 2	Era 4 vs Era 3
HCC			
Unadjusted Hazard Ratio	0.70 (0.53-0.92)	0.90 (0.70-1.16)	0.68 (0.52-0.90)
Adjusted Hazard Ratio*	0.69 (0.52-0.91)	0.89 (0.69-1.15)	0.67 (0.51-0.88)
Non-HCC			
Unadjusted Hazard Ratio	0.85 (0.75-0.97)	0.70 (0.61-0.82)	0.81 (0.67-0.98)
Adjusted Hazard Ratio*	0.86 (0.75-0.98)	0.69 (0.59-0.81)	0.80 (0.67-0.97)

* Adjusted for recipient and donor characteristics but NOT for use of DCD livers.

Summary

- Annual number of liver transplantations increased from 409 in 1997 to 582 in 2016

AND

Percentage of transplantation for HCC increased from 9.8% to 21.6%.

- Since 1997, relatively little change in characteristics of HCC recipients.
- In 2017, 32% of HCC recipients had DCD livers.
- Since 1997, HCC recipients have consistently worse survival than non-HCC recipients.
- Survival improvement for HCC AND non HCC.

Conclusion

Since 1997:

There is a continued improvement of survival
for HCC recipients

AND

for non-HCC recipients
despite increasing use of DCD livers.

Appendices: Comparison of 5-year patient survival between HCC and non-HCC patients

	Era 1	Era 2	Era 3	Era 4
Unadjusted				
HCC	1.64 (1.33-2.03)	1.35 (1.08-1.67)	1.71 (1.42-2.09)	1.46 (1.12-1.89)
Non-HCC	1	1	1	1
Adjusted				
HCC	1.50 (1.19-1.87)	1.21 (0.96-1.51)	1.54 (1.25-1.91)	1.28 (0.98-1.69)
Non-HCC	1	1	1	1

* Adjusted for recipient and donor characteristics but NOT for use of DCD livers.