

# MELD and Its Perioperative Utility

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- Review of MELD score and its impact on organ allocation
  - Impact of MELD on the perioperative management
  - Recommendation & future development

# MELD Formula

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$$\begin{aligned} \text{MELD score (6 to 40)} \\ &= 1.12 \times \ln(\text{INR}) \\ &+ 0.96 \times \ln(\text{creatinine}) \\ &+ 0.38 \times \ln(\text{total bilirubin}) \\ &+ 0.64 \end{aligned}$$

## Three-Month Mortality of Patients with Liver Disease

MELD	< 10	10-19	20-29	30-39	> 39
Hospitalized	4%	27%	76%	83%	100%
Historical	8%	26%	56%	66%	100%
Outpatient non-cholestatic	2%	5.6%	50%		

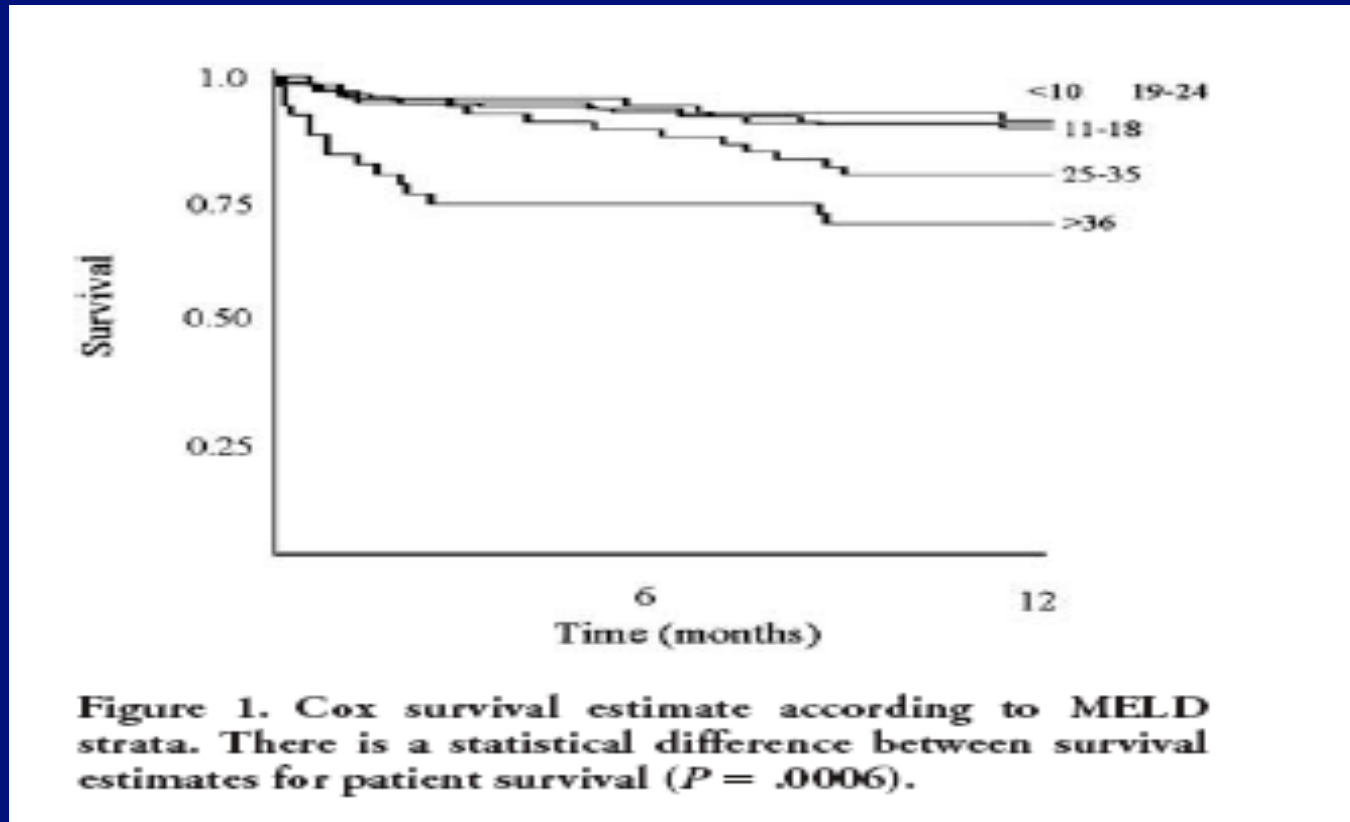
Wiesner R, et al Liver Transpl 2001;7:567-680

# Impact of MELD on Organ Allocation

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- The number of patients on the wait list ↓
- MELD score at LT ↑
- The waiting time ↓
- Patients removed from the wait list ↓
- **Mortality of patients on the wait list** ↓
- The patient survival after LT in the MELD era has not changed
- Concerns (sickest first)

# MELD Score Predicts 1-Year Patient Survival Post-Orthotopic Liver Transplantation



Saab S, et al Liver Transpl 2003; 9: 474

# Patient 1-yr Survival under the MELD System

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<b>MELD Score</b>	<b>1-yr Survival</b>
7-15	89.5%
16-25	88.3%
26-35	86.6%
> 35	78.1%

Freeman R, et al. Transpl Proc 2005; 37: 585

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# Impact on the Perioperative Management

Higher MELD = Higher Periop Risks?

# Preop Characteristics in Low and High MELD Patients

	Low MELD (n=73)	High MELD (n=51)	P values
MELD scores	21.8 ± 6.6	36.6 ± 3.0	
Age (yr)	53.4 ± 7.6	51.7 ± 10.0	NS
Hypertension (%)	13.7	13.7	NS
CAD (%)	4.1	3.9	NS
DM (%)	16.4	21.6	NS
Encephalopathy (%)	27.4	47.1	NS
Ascites (%)	42.6	84.4	< 0.001
Dialysis (%)	0	35.3	< 0.001
Ventilator (%)	1.4	23.5	< 0.001
Vasopressors (%)	0	13.7	0.001

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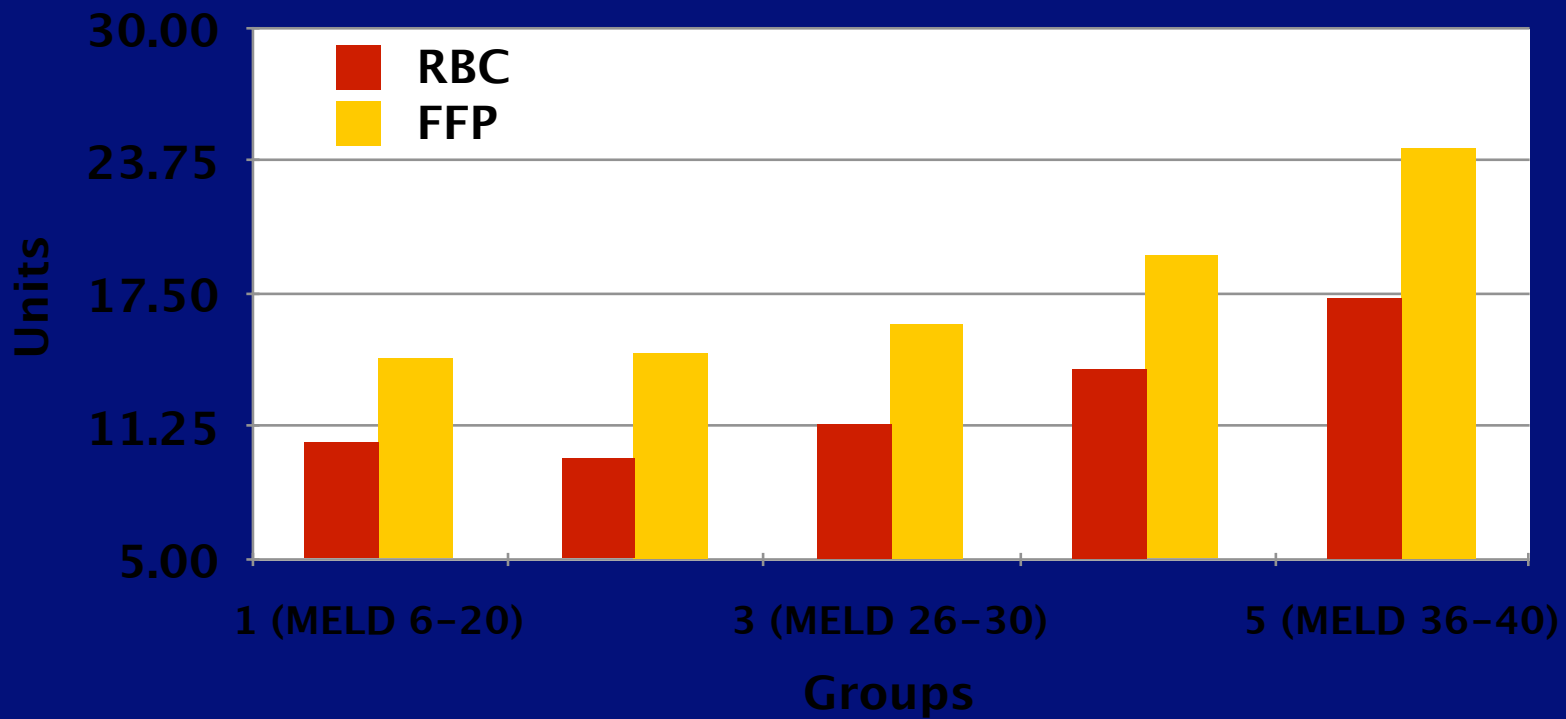
# Baseline Lab in Low and High MELD Groups

	Low MELD (n=73)	High MELD (n=51)	P values
INR	1.4 ± 0.3	2.1 ± 0.7	< 0.001
Cr	1.2 ± 0.7	2.7 ± 1.5	< 0.001
Hct	31.8 ± 4.9	29.4 ± 5.3	0.010
Fibrinogen	204.5 ± 113.1	154.9 ± 74.9	0.001
Platelets	84.7 ± 64.5	70.4 ± 56.0	NS
K <sup>+</sup>	4.0 ± 0.7	3.9 ± 0.6	NS
BE	-3.1 ± 4.4	-2.7 ± 4.2	NS

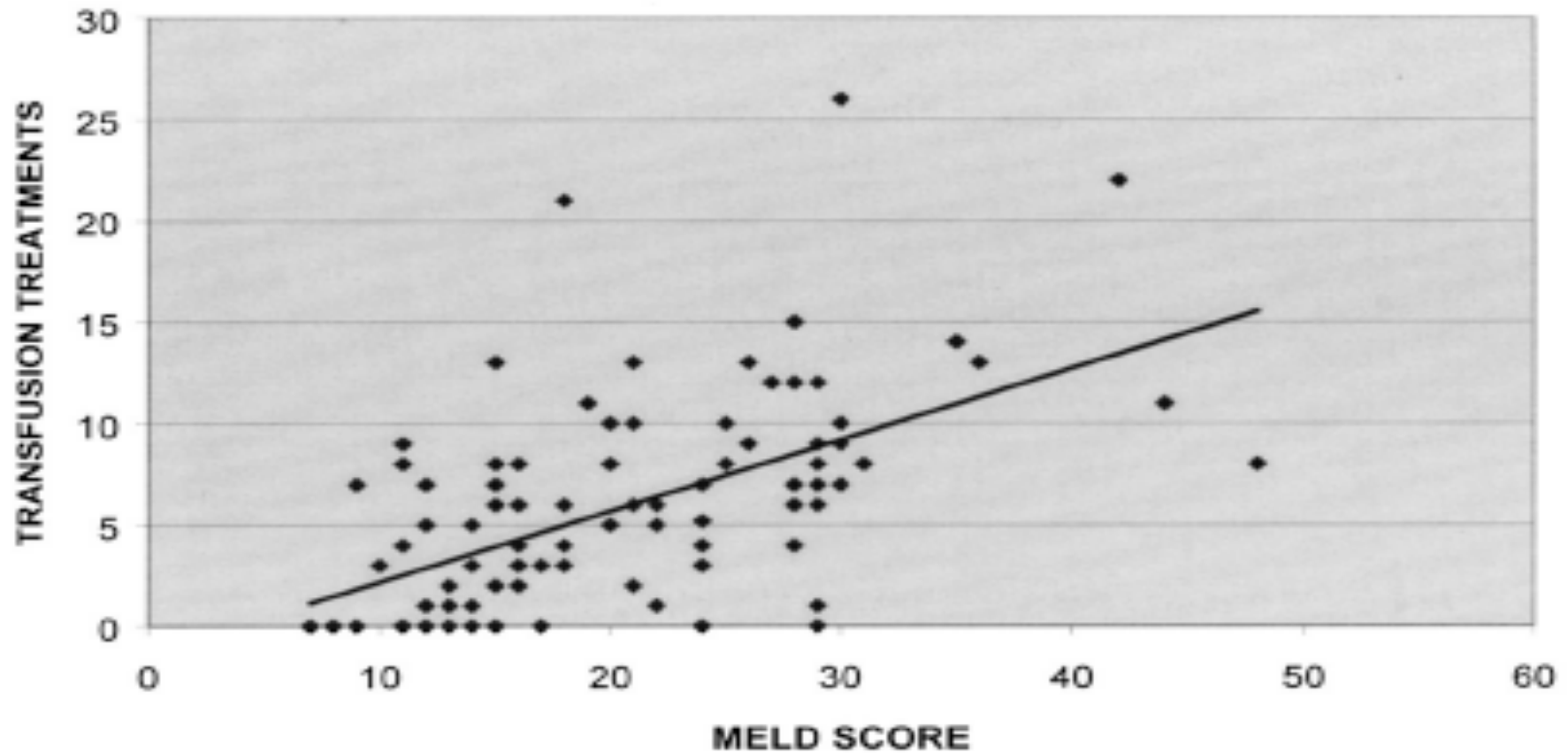
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# Total RBC and FFP in 5 MELD Groups

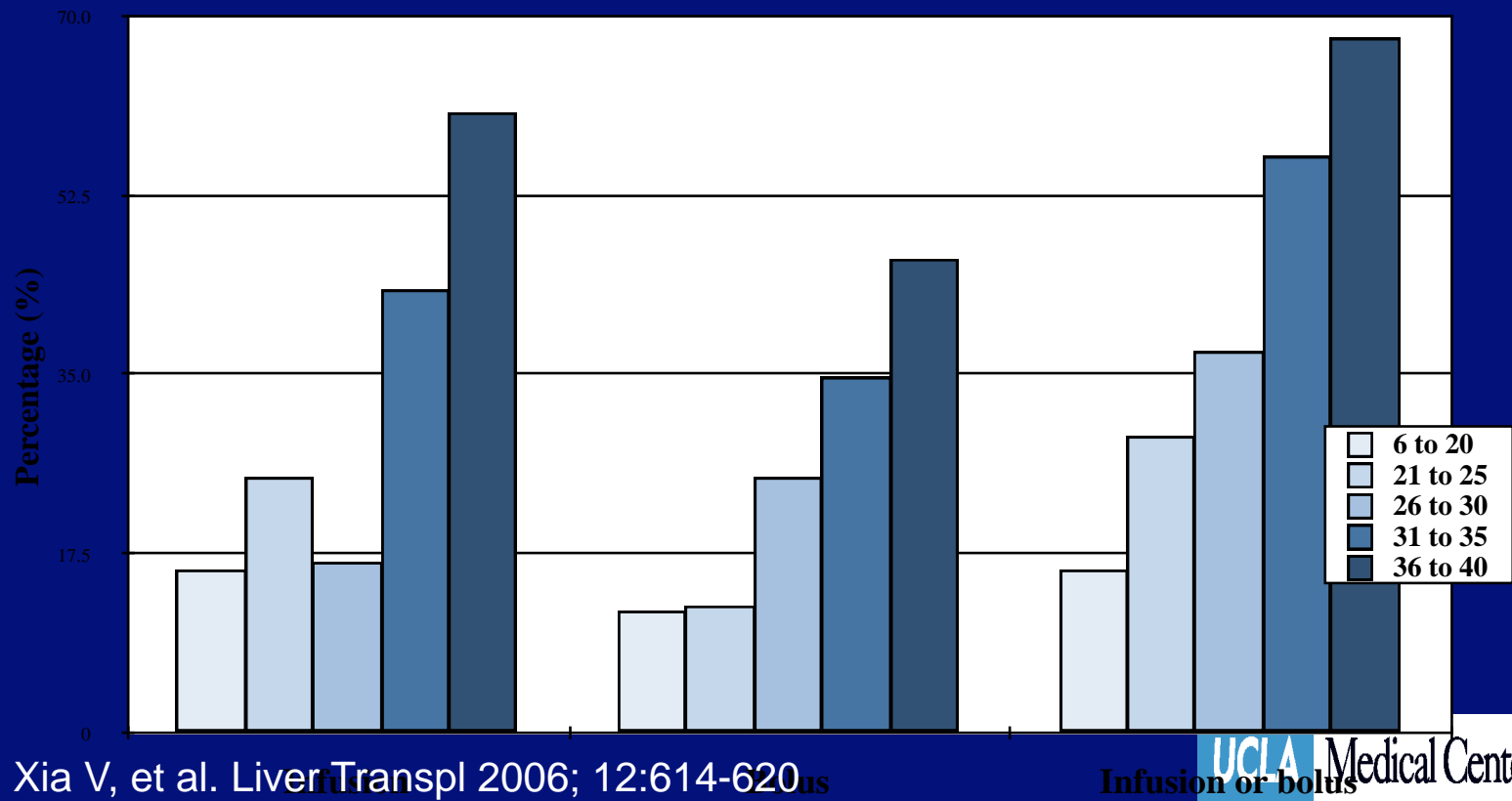


## MELD VS TRANSFUSION TREATMENT



Frasco P, et al. A&A 2005; 101: 30

# Requirements of Vasopressors in 5 MELD Groups



# Intraop Transfusion and Vasopressor Requirements

	No Ascites	Ascites	
Patients (n)	104	88	
RBC (units)	11.8 ± 9.0	16.6 ± 9.6	0.001
FFP (units)	16.1 ± 11.8	22.0 ± 11.0	0.001
Vasopressors	39 (37.5%)	53 (60.2%)	0.002

	Na > 130	Na ≤ 130	
Patients (n)	166	26	
RBC (units)	14.4 ± 0.0	12.0 ± 6.3	0.245
FFP (units)	19.3 ± 12.2	16.0 ± 8.9	0.190
Vasopressors	82 (49.4%)	10 (38.5%)	0.299

# MELD and Resource Utilization

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- Pre-LT hospital stay ↑
- Post-LT hospital stay ↑
- Patients discharged home ↓
- Total cost ↑
  - Pharmacy
  - Laboratory
  - Radiology
  - Dialysis
  - Physical therapy

# Postoperative Complication

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- ❑ Mental status change
- ❑ Infection
- ❑ Biliary problems
- ❑ Renal failure

# Summary: Perioperative Impact

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- Preoperative
  - MELD-related (INR, Cr, Bil, dialysis, and ascites)
  - MELD-unrelated (Hct, fibrin, ventilator, and vasopressor requirement, hospital stay)
- Intraoperative
  - Transfusion and vasopressor requirements
- Postoperative
  - Mental status change, infection, biliary problem and renal failure
- Resource utilization
  - Hospital stay, total cost

# Recommendation & Future Development

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- ❑ More studies are needed (verify previous studies, studies in new fields, balance for both patient and society benefits)
- ❑ Should we use the MELD score in the same or similar way we use ASA status? (gold standard severity index for liver disease, critical pre-LT characteristics in clinical practice and study comparisons)
- ❑ How can we use the information (MELD) to guide our perioperative management?
- ❑ Strategies to reduce the perioperative risk in the MELD era may have a long-term positive impact

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知己知彼， 百战不贻

by Sun Tzu in *The Art of War*

(6<sup>th</sup> century BC)

If you know both your enemy and know yourself, you need not fear the result of hundred battles.

Thank You



# Question

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- How many people in the audience know the MELD score before the patient is induced for liver transplantation? Raise your hand if you know or at least try to find out.