Caring for the patient with cirrhosis

Role of the hospitalist

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Disclosure

- Grant/research support: Grifols

Topics to be covered

- Evaluation and management of hepatic decompensation
  - Hepatic encephalopathy
  - Gastrointestinal bleeding
  - Ascites
  - Hepatorenal syndrome
- Acute on chronic liver failure
- Liver transplant evaluation basics

What will not be covered

- Acute liver failure
- Management of alcoholic hepatitis
- Hepatocellular carcinoma diagnosis and management

Case 1

- 57yo man with alcoholic cirrhosis presents with altered mental status
- His family brought him in because he was staring blankly at them when they asked him questions and seemed unable to feed himself

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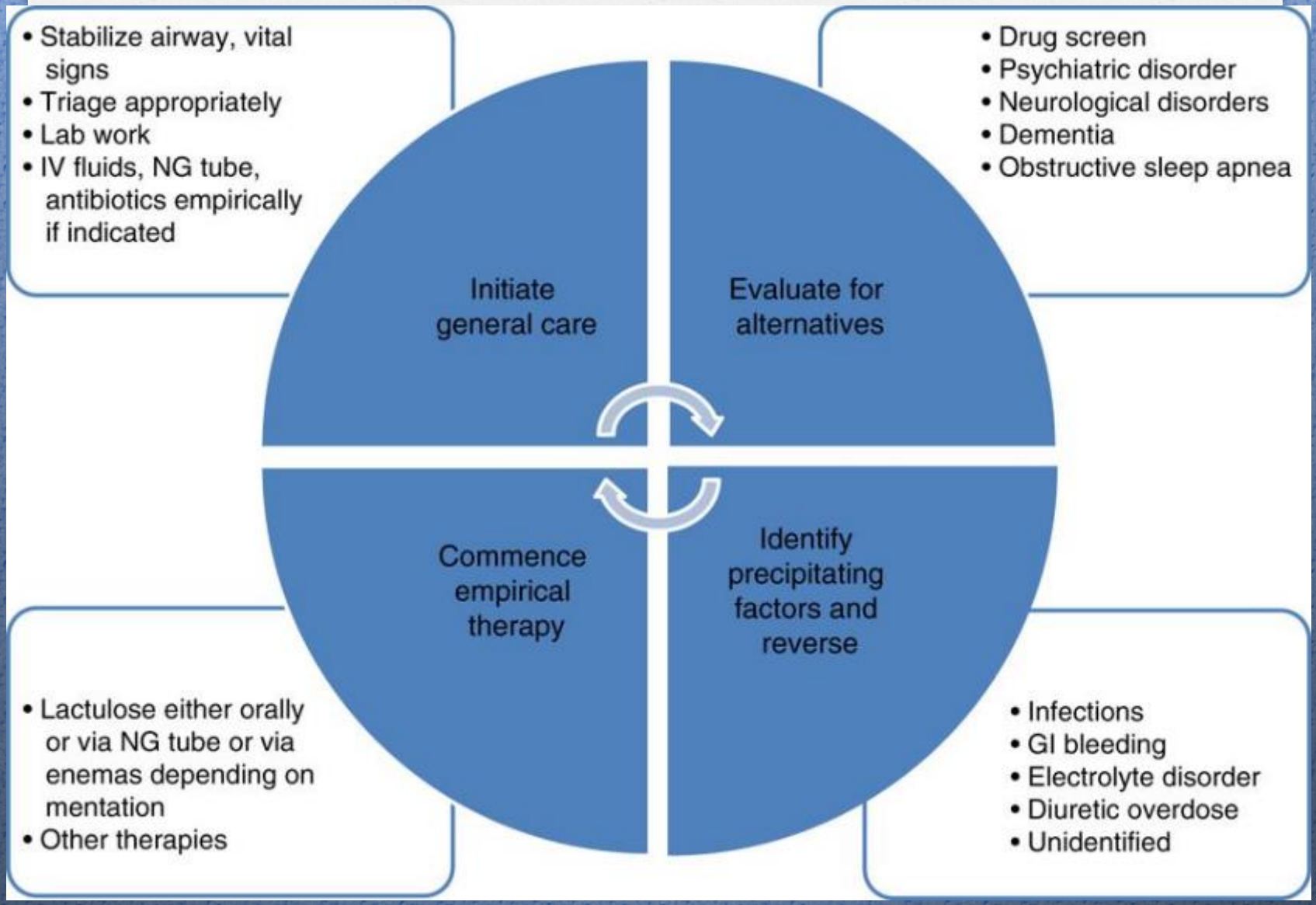
- His family brought him in because he was staring blankly at them when they asked him questions and seemed unable to feed himself
- T 37 HR 75 BP 112/73 RR 12 SpO2 97%
- Slow to respond but awake, oriented to first name only and keeps repeating that despite other questions asked. +asterixis
- Icteric sclerae
- Nontender abdomen with bulging flanks
- WBC 4, hct 29, plts 85, INR 1.8, Na 136, Cr 0.8, tbili 6.3

Hepatic encephalopathy (HE)

- Presents with a spectrum of symptoms
  - Covert/minimal
  - Overt: change in attention, sleep→disorientation, asterixis, lethargy→coma
- Overt hepatic encephalopathy (OHE) will occur in 30-40% of all patients with cirrhosis
- Recurrent OHE risk is 40% at 1 year
  - Subsequent recurrence is 40% at 6 months

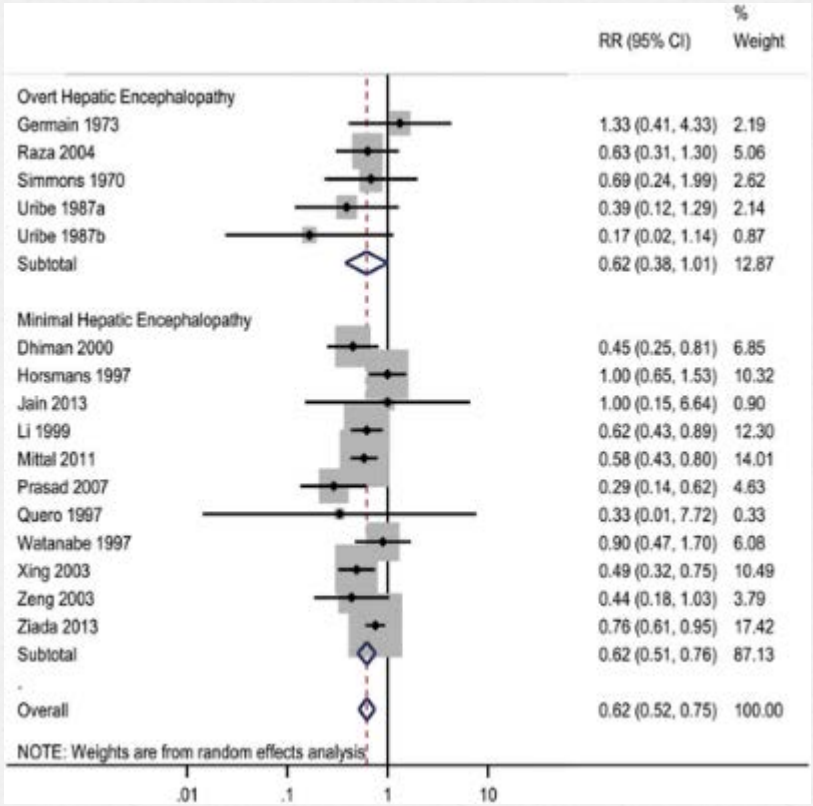
Vilstrup et al, *Hepatology*, 2014.

Management of hepatic encephalopathy



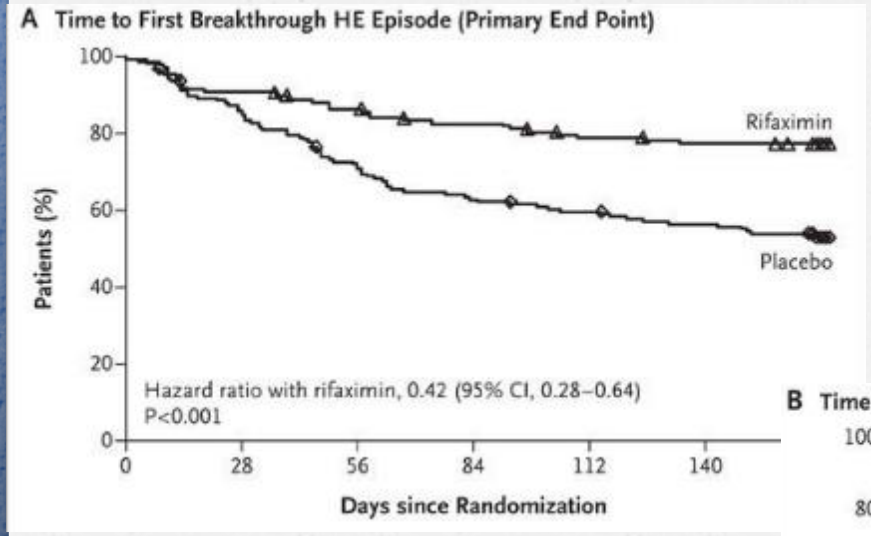
Acharya, *AJG*, 2018.

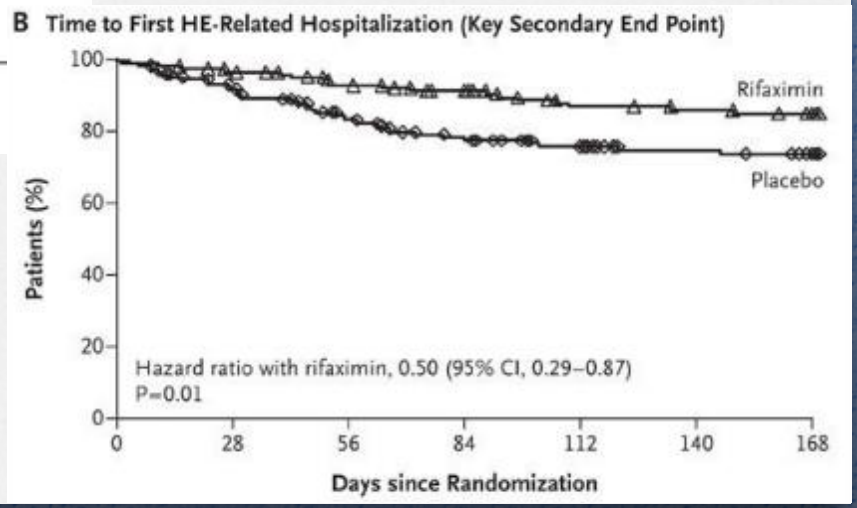
Nonabsorbable disaccharides



Gluud, *Hepatology*, 2016.

Rifaximin reduces HE recurrence and need for hospitalization

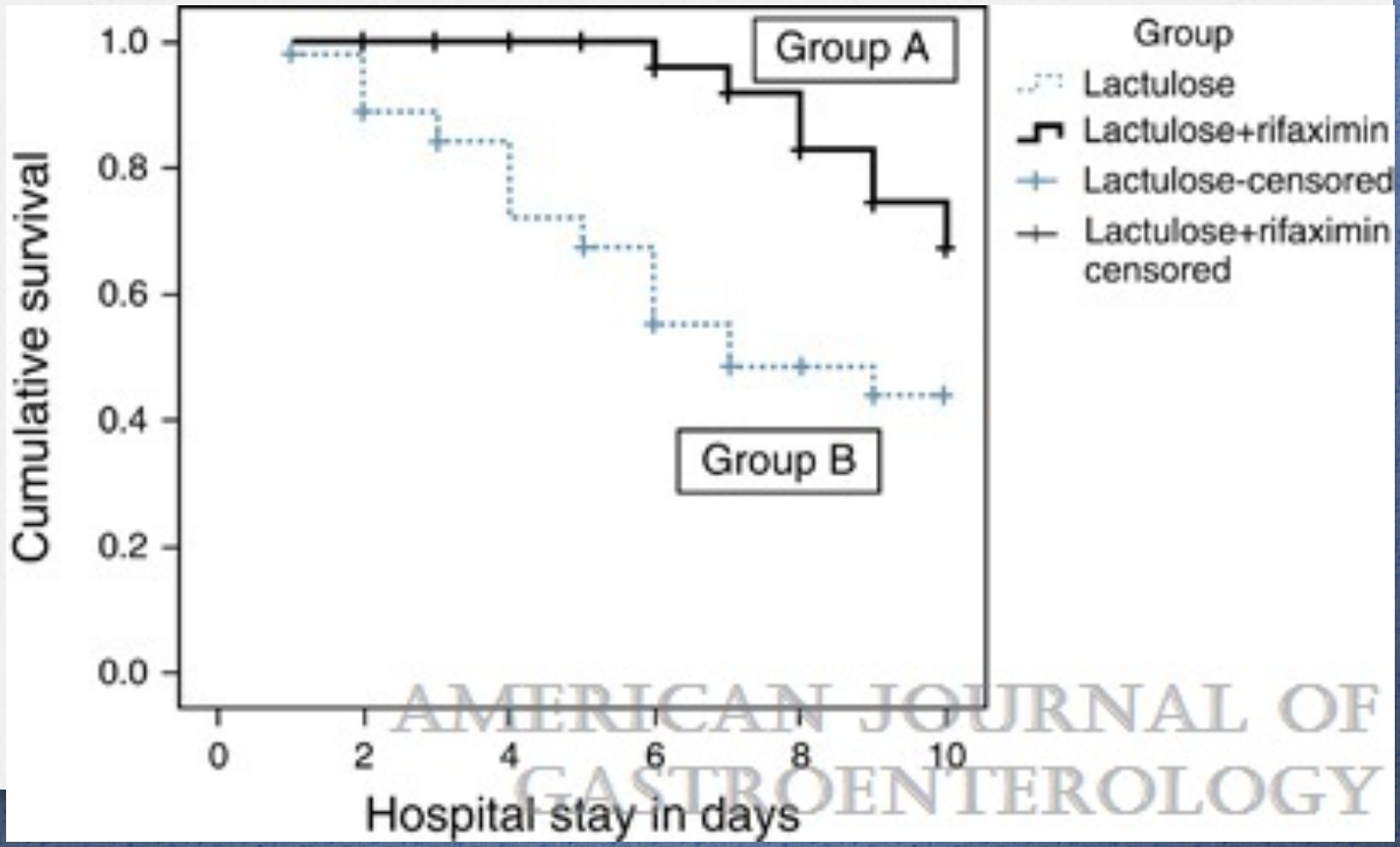




- Dose: 550mg PO BID
- Used as add-on therapy in combination with lactulose

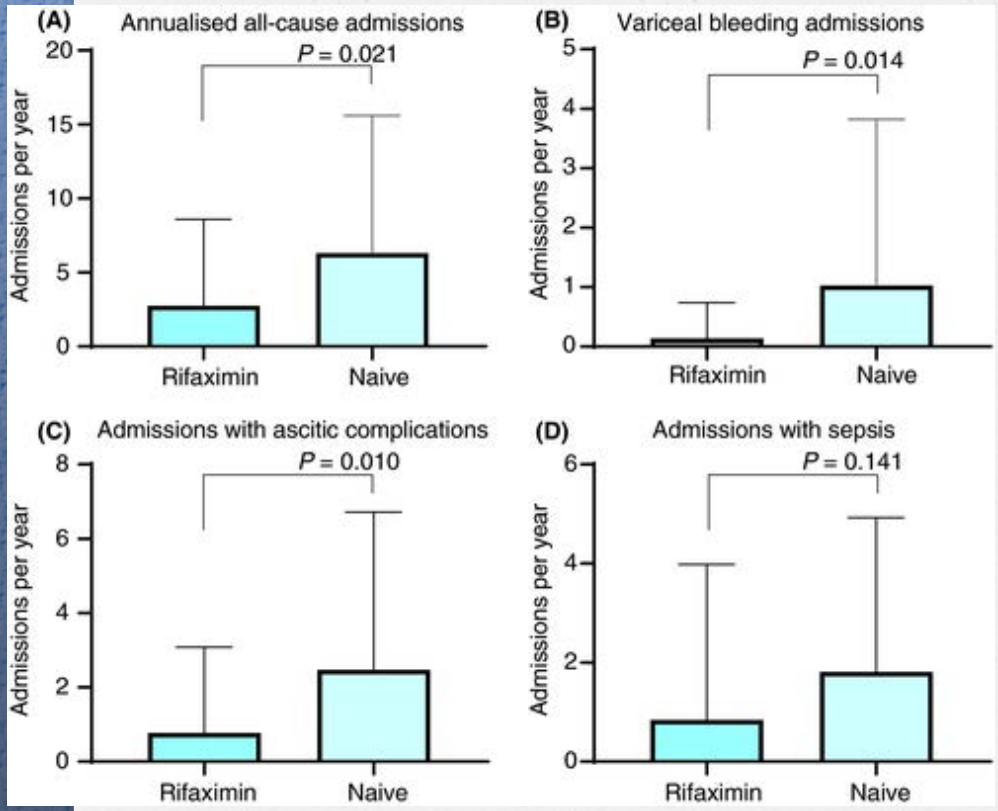
Bass, *NEJM*, 2010.

Lactulose + rifaximin is more effective than lactulose alone



Sharma, *AJG*, 2013.

Impact of rifaximin may extend beyond HE

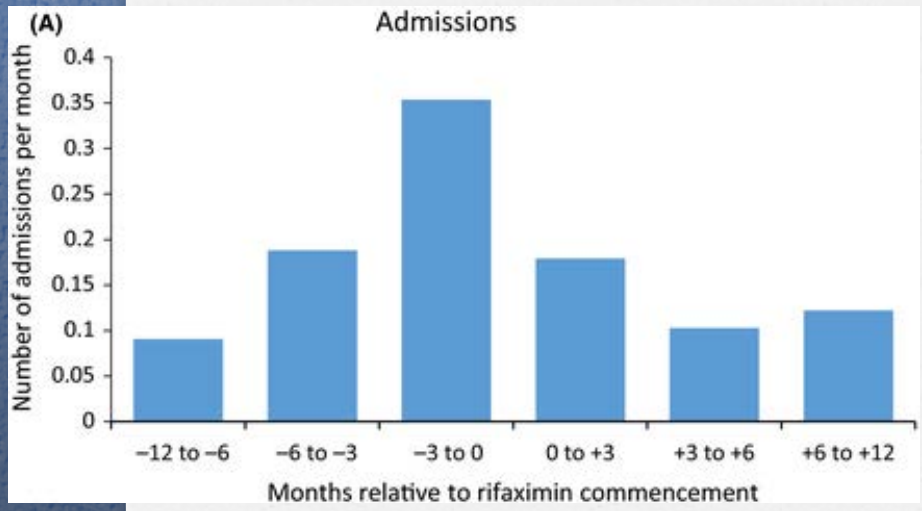


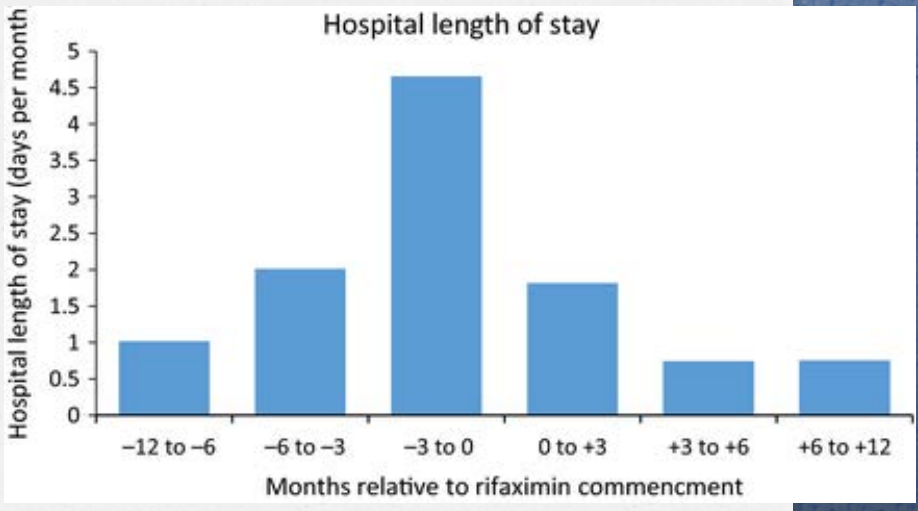
- Limitations of this study
  - Non-randomized
  - Rifaximin may be a marker for higher quality care

Salehi, *AP&T*, 2019.

Rifaximin reduces cost

- Several studies have demonstrated potentially favorable cost effectiveness





Neff, *PharmacoEconomics*, 2018.
Orr, *Liver International*, 2016.

Other HE treatments of interest

- Polyethylene glycol (GoLytely)
- L-ornithine-l-aspartate (LOLA)
- Glyceryl phenylbutyrate
- Fecal microbiota transplant
- Probiotics
- Transvenous obliteration of portosystemic shunts
- (Neomycin, metronidazole)

Nutritional status and HE

- It is important to do a nutritional assessment on patients with HE
  - Subjective global assessment (lacks sensitivty)
  - Grip strength
- Protein restriction should be avoided
  - 1.2-1.5g/kg ideal body weight recommended
- Avoid fasting >3-6 hours during the day
  - Small, frequent meals
  - Late evening snack

Amodio, *Hepatology*, 2013.

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Hepatic encephalopathy
Summary

- Precipitants of overt hepatic encephalopathy should be investigated
- Lactulose is the cornerstone of HE management
- Rifaximin should be used as add on therapy and reduces cost of care
- Protein restriction should be avoided

Case 2

- 63M with cirrhosis due to autoimmune hepatitis presents with complaints of several episodes of melena x 1 day

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- Recent onset ascites and jaundice

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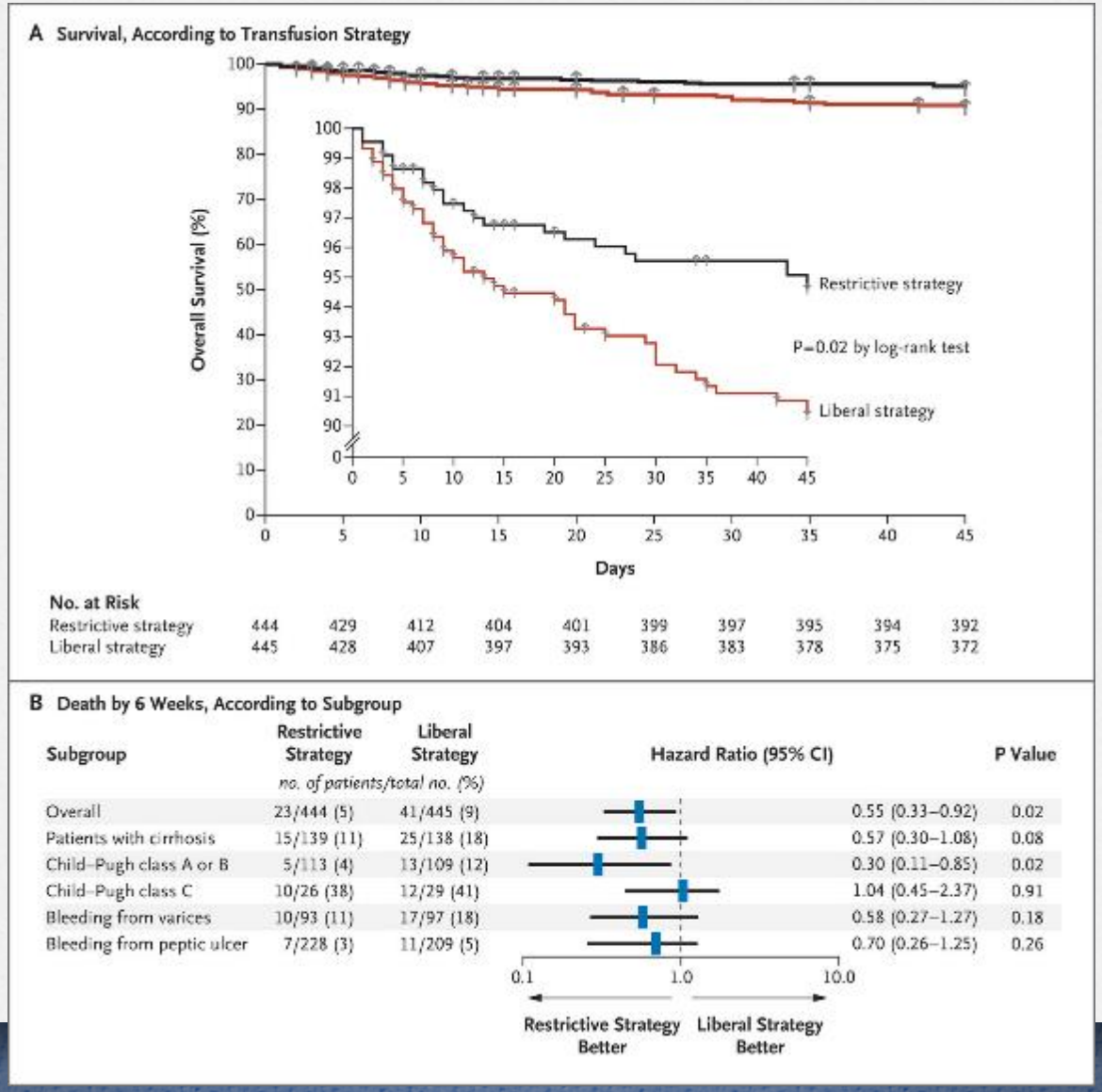
- Recent onset ascites and jaundice
- VS: HR 120 BP 95/63 RR 20 SpO2 95%
- Gen: uncomfortable, lethargic
- Abd: distended, bulging flanks, mildly uncomfortable to palpation but no peritoneal signs. +melenic stool
- Labs: WBC 4, Hb 5.7, plts 80, INR 1.6, Na 136, Cr 0.9, total bili 4.3

Management of GI bleeding in cirrhosis

- ABCs
- Type and cross pRBCs +/- FFP and platelets
- Octreotide
- PPI IV

Transfuse to a goal Hb 7-9g/dL



Villanueva, *NEJM*, 2013.

No definitive data on INR or platelet goals

- INR is a poor predictor of bleeding (or clotting) risk in cirrhosis
- Recombinant factor VIIa not clearly beneficial
- No guidance available on platelet goal

Octreotide reduces mortality and need for transfusion

- Octreotide dosing
  - Initial bolus of 50 µg (repeat in first hour if ongoing bleeding)
  - Continuous IV infusion of 50 µg/hr for up to 5 days
- Use of vasoactive agents reduces 7-day mortality by 36%
- 32% decreased risk of rebleeding
- Blood transfusion requirement 0.7 units lower n patients receiving vasoactive agents

Wells, *Alim Pharm Ther*, 2012.
Garcia-Tsao, *Hepatology*, 2016.

Antibiotics improve outcomes in GI bleeding in cirrhosis

- Risk of infection after GI bleeding may be as high as 35-66% within 2 weeks
- Meta-analysis demonstrated reduced risk of infection compared with placebo
  - Any infection: 14% vs 45%
  - SBP or bacteremia: 8% vs 27%
- First line antibiotic choice: ceftriaxone

Bernard, *Hepatology*, 2003.
Garcia-Tsao, *Hepatology*, 2016.

Predictors of poor outcome after variceal bleeding

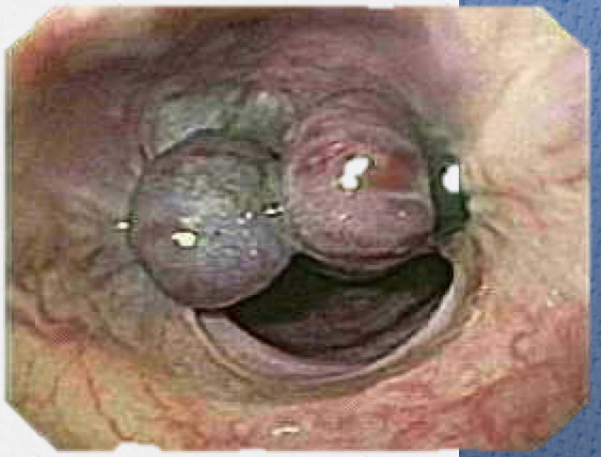
- Child-Pugh class
- AST
- Shock on admission
- Portal vein thrombosis
- HCC
- Active bleeding at endoscopy
- Hepatic venous pressure gradient >20
- MELD

10-15% of patients with have persistent and/or early rebleeding

Avgerinos, *Hepatoloogy*, 2004.
Reverter, *Gastroenterology*, 2013.
Ripoll, *Hepatology*, 2005.
Thomopoulos, *Dig Liver Dis*, 2006.
Bambha, *Gut*, 2008.
Lecleire, *J Clin Gastro*, 2005.

Endoscopic therapy in variceal bleeding

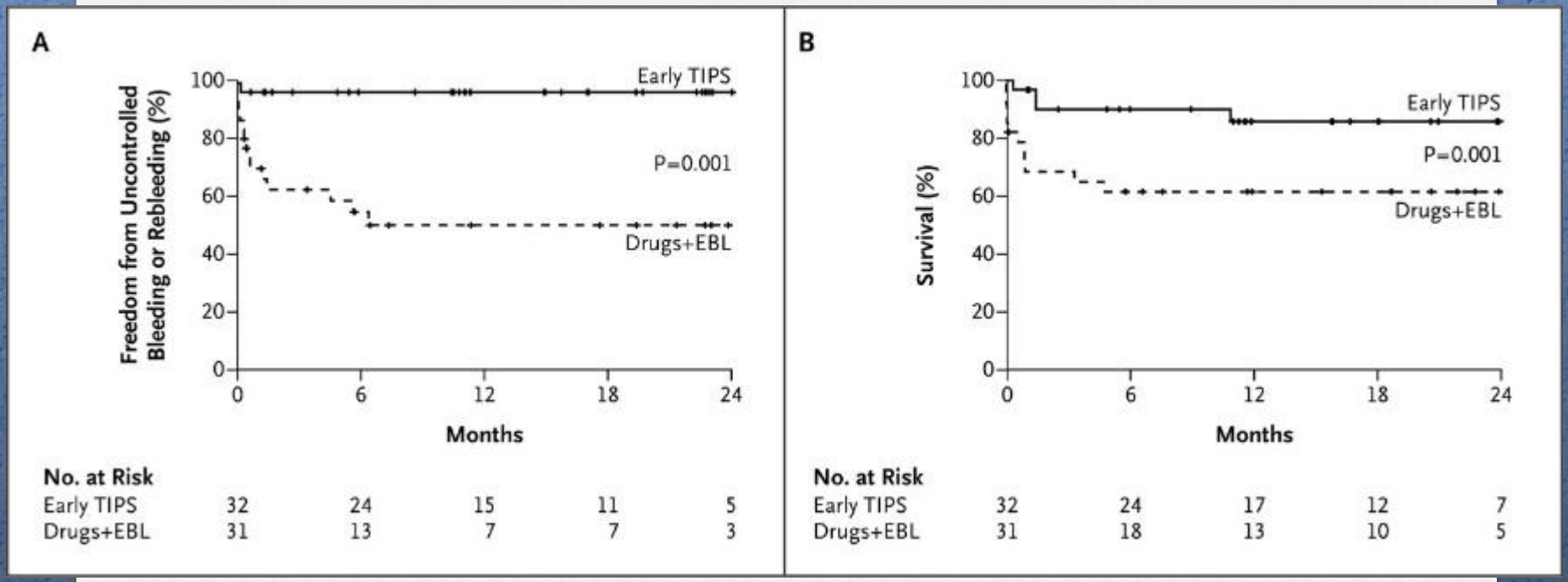
- Band ligation within 12 hours considered standard of care for esophageal varices
  - Failure rate: 15-25%
- Other modalities
  - (Hemostatic powder/spray)
  - Esophgeal stent
  - (Sclerosants)
  - Gastro-esophageal balloon tamponade
- Treatment for gastric varices: cyanoacrylate injection +/- coil



Ibrahim, *Gastro*, 2018.

Ibrahim, Gut, 2018.
Pfisterer, *Liver Int*, 2018.

Early TIPS in variceal bleeding



Careful patient selection is critical

Garcia-Pagan, *NEJM*, 2010.

Care after variceal bleeding

- Recurrent variceal bleeding risk is 60% in the first year, and up to 33% mortality

Garcia-Tsap, *Hepatology*, 2016.
Shaheen, *Hepatology,* 2005.

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  - Combination of NSBB + band ligation is superior to either alone

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Shaheen, *Hepatology,* 2005.

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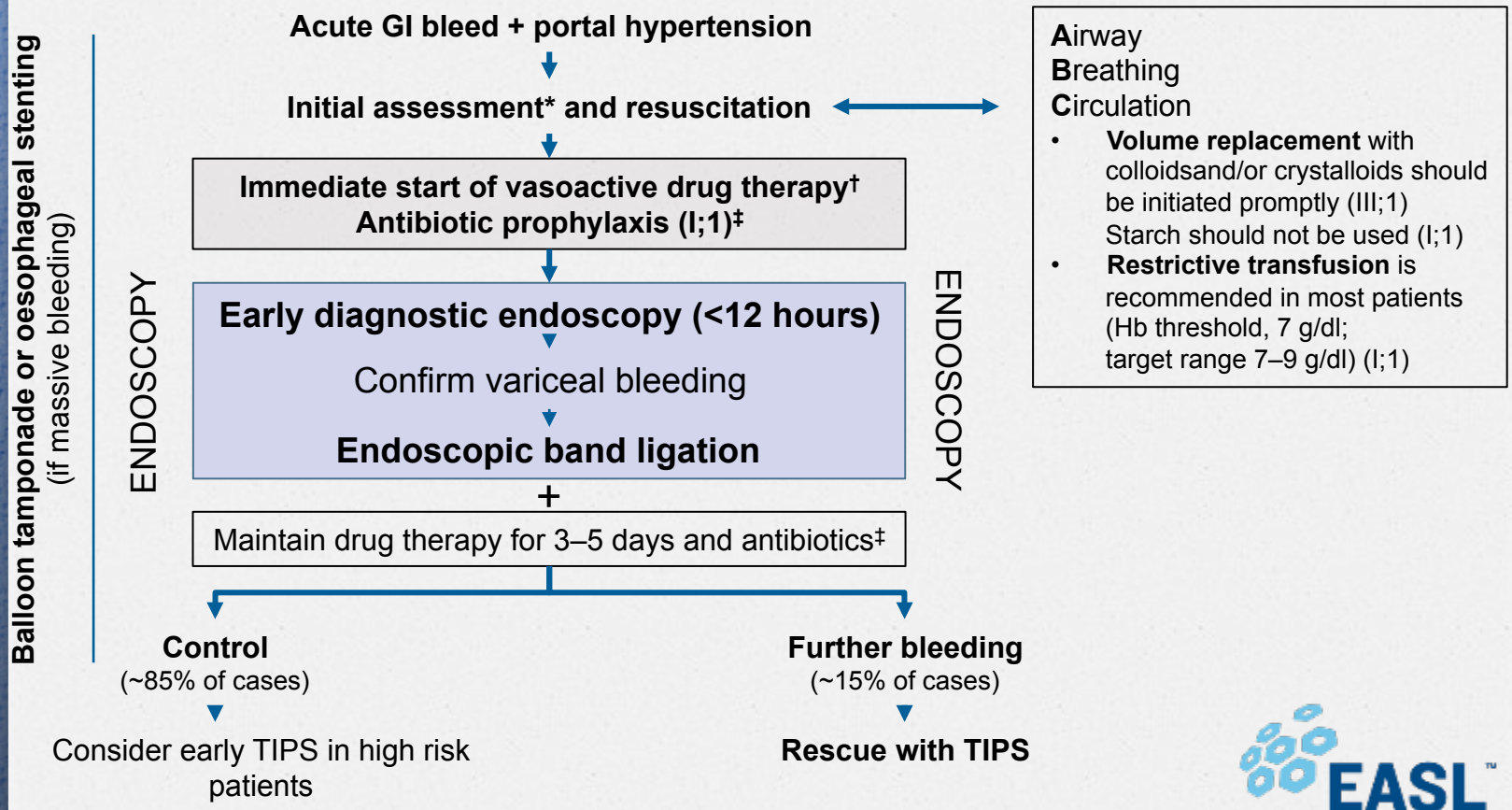
- Endoscopy should be repeated every 1-4 weeks until varices eradicated
- Consider PPI for 10 days post-banding
- TIPS for recurrent bleeding

Garcia-Tsap, *Hepatology*, 2016.
Shaheen, *Hepatology,* 2005.

Acute variceal bleeding
Summary

- **Medical emergency**: high rate of complications and mortality in DC
  - Requires immediate treatment and close monitoring



Case 3

- 55F with NASH cirrhosis presents to the emergency department with complaints of abdominal pain and distension

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- 55F with NASH cirrhosis presents to the emergency department with complaints of abdominal pain and distension
- VS: T37 HR 65 BP 110/70 RR 20 SpO2 98%
- Gen: chronically ill, slightly uncomfortable due to abdominal distension
- Resp: normal other than decreased BS at bases
- GI: tensely distended abdomen with dullness to percussion, nontender
- Neuro: AAOx3, no asterixis

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- GI: tensely distended abdomen with dullness to percussion, nontender
- Neuro: AAOx3, no asterixis
- Labs: WBC 5, hct 30, plt 70, INR 1.5, Na 130, Cr 0.7, total bili 5, albumin 3.0

Ascites: Diagnostic tests

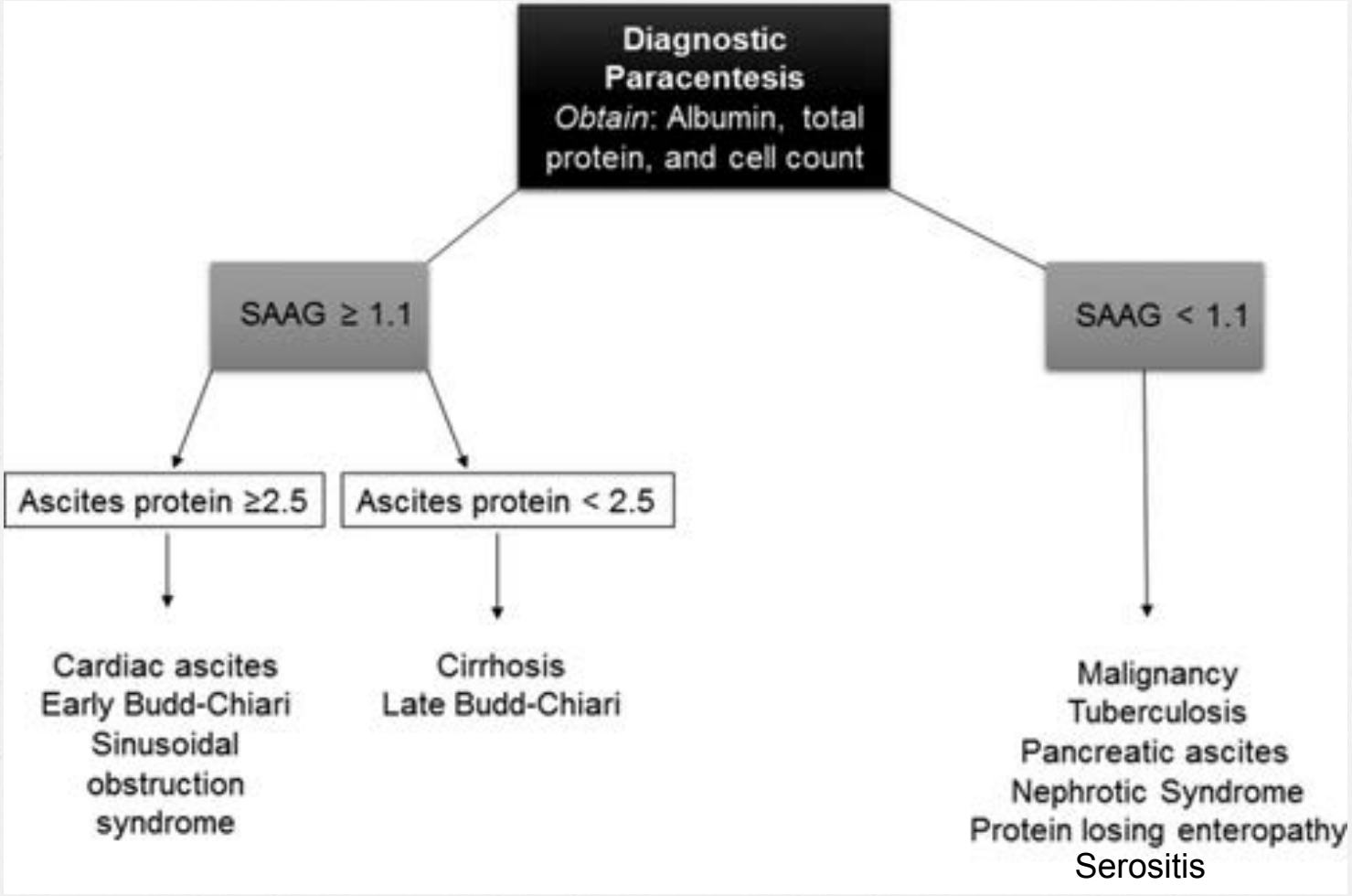
- Abdominal ultrasound: confirm ascites, eval portal and hepatic vein patency, r/o HCC
- Diagnostic paracentesis
  - Complication rate: 1%; <0.1% risk of hemoperitoneum or bowel entry)
  - Routine fluid analysis: cell count with differential, albumin, total protein, culture
    - Serum to ascites albumin gradient (SAAG)
    - Use of blood culture bottles with higher culture yield
  - Additional fluid analysis: LDH, glucose, CEA, alkaline phosphatase, cytology, AFB culture, triglycerides, bilirubin, creatinine

Runyon, *Hepatology*, 2009.

Paracentesis

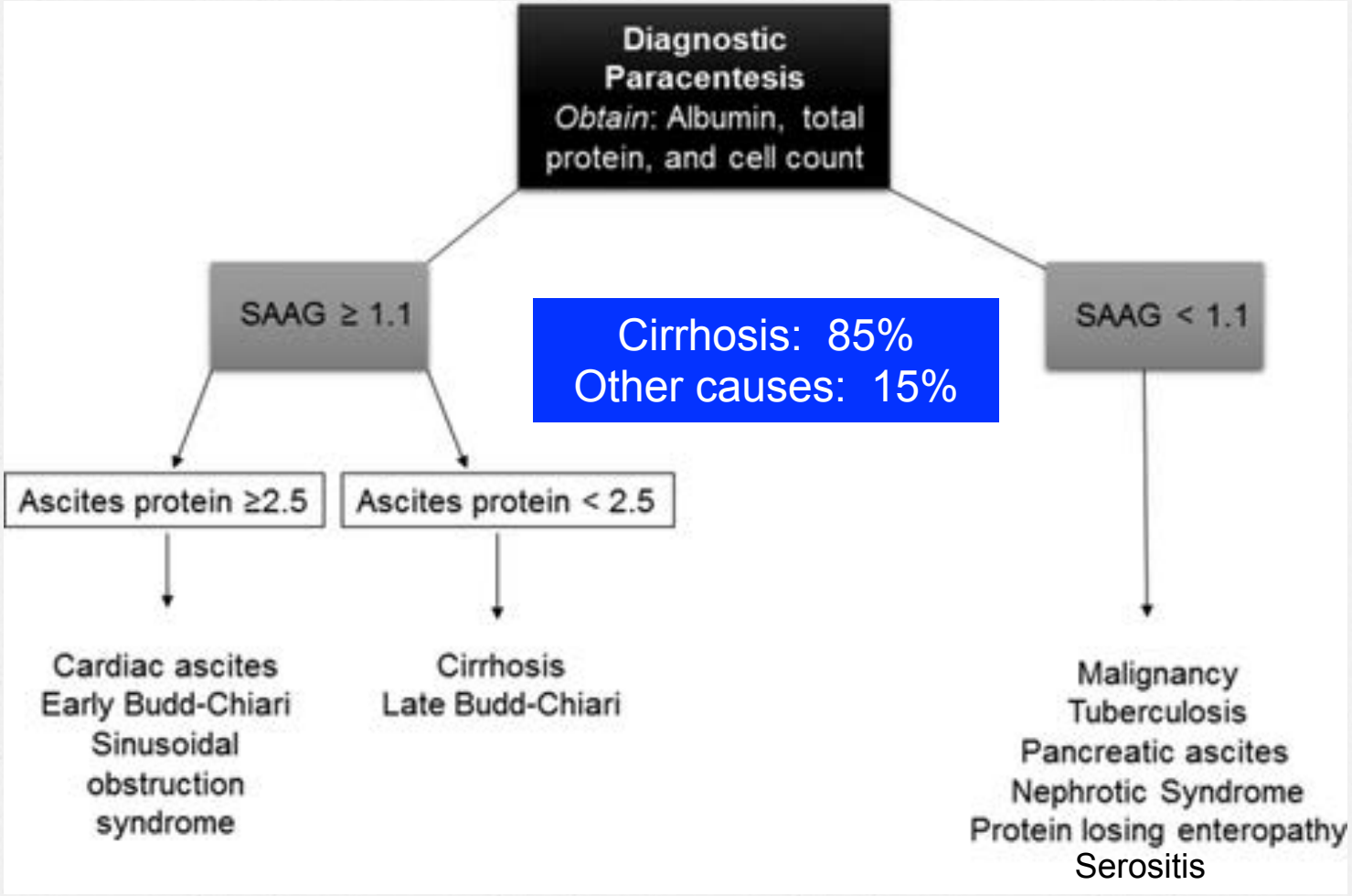
- Diagnostic paracentesis
  - 1st paracentesis
    - Cell count w/ diff
    - Culture
    - Albumin
    - Total protein
    - Additional studies as guided by clinical presentation
  - Subsequent paracentesis: cell count w/ diff and culture

Ascites: diagnosis by SAAG



Hernaez, *Clin Liver Dis*, 2016.

Ascites: diagnosis by SAAG



Hernaez, *Clin Liver Dis*, 2016.

Case 3 (cont'd)

- 55F with NASH cirrhosis presents to the emergency department with complaints of abdominal pain and distension
- US: Coarse, nodular liver without focal mass. Splenomegaly. Patent portal and hepatic veins. Large ascites
- Paracentesis with removal of 5L amber fluid
  - WBC 893 (75% PMNs), RBC 100
  - Albumin 1.0, total protein 1.2
  - Cultures pending

Spontaneous bacterial peritonitis (SBP)

- ~30% of patients with SBP may lack typical signs/symptoms of fever, abdominal pain, and/or leukocytosis
- Diagnosis: 250 PMNs/mm^3
- Prognosis
  - In-hospital death: 10-20%
  - Median survival: 9 months
  - Recurrent SBP: 40-70% at 1 year

Garcia-Tsao, *Sherlock's Dis of the Liver and Biliary System*, 2011.

Management of SBP

Key principles

- Treatment of infection
- Prevention of hepatorenal syndrome/AKI
- Assessment of response to treatment
- Prevention of recurrent infection

Antibiotic therapy for SBP

- "Community acquired"
  - Typical bacteria: *E. coli, K. pneumoniae, streptococcus*
  - 3rd gen cephalosporin or fluoroquinolone for 5-7d
- "Nosocomial"
  - Specific choice of antimicrobial should be guided by local flora and resistance patterns
    - RCT: Meropenem+dapto vs ceftazidime had higher rates of response, but no substantial impact on survival

Runyon, *Hepatology*, 2012.
Piano, *Hepatology*, 2016.

Infections with antibiotic resistant organisms

- Risk factors
  - Prior exposure to antibiotics within 30 days of diagnosis of AR infection
  - Nosocomial infection
  - Prior infection with AR organisms within 6 months
- Impact on outcome
  - Lower rate of infection resolution
  - Increased risk of in hospital mortality

Tandon P, *Clin Gastro Hep*, 2016.
Fernandez J, *Hepatology*, 2011.

Prevention of HRS in SBP

- RCT of 126 patients with SBP treated with cefotaxime, albumin vs no albumin
  - 1.5g/kg on day 1, 1g/kg on day 3

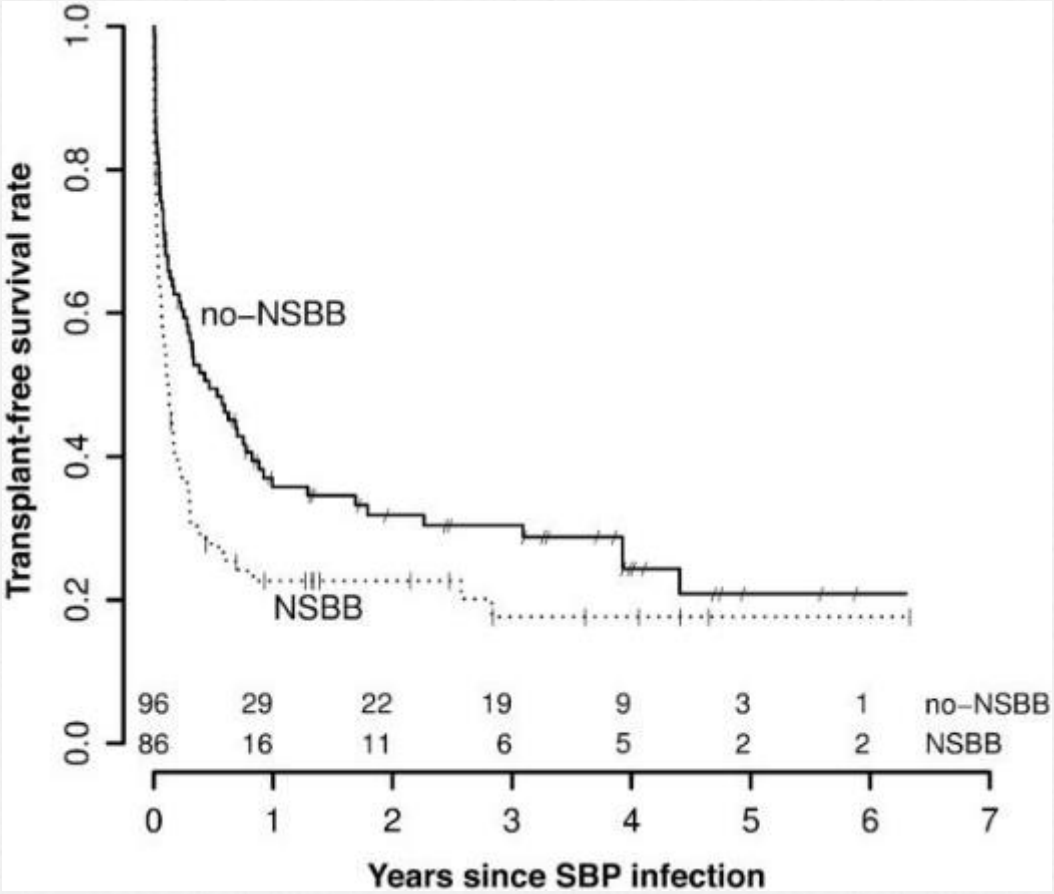
	Albumin	Control	p value
Renal impairment	10%	33%	0.002
Death			
In hospital	10%	29%	0.01
3 months	22%	41%	0.03

- Impact may be greatest in patients with Cr>1, BUN>30, and/or tbili >4

Sort P et al, *NEJM*, 1999.
Sigal et al, *Gut*, 2007.

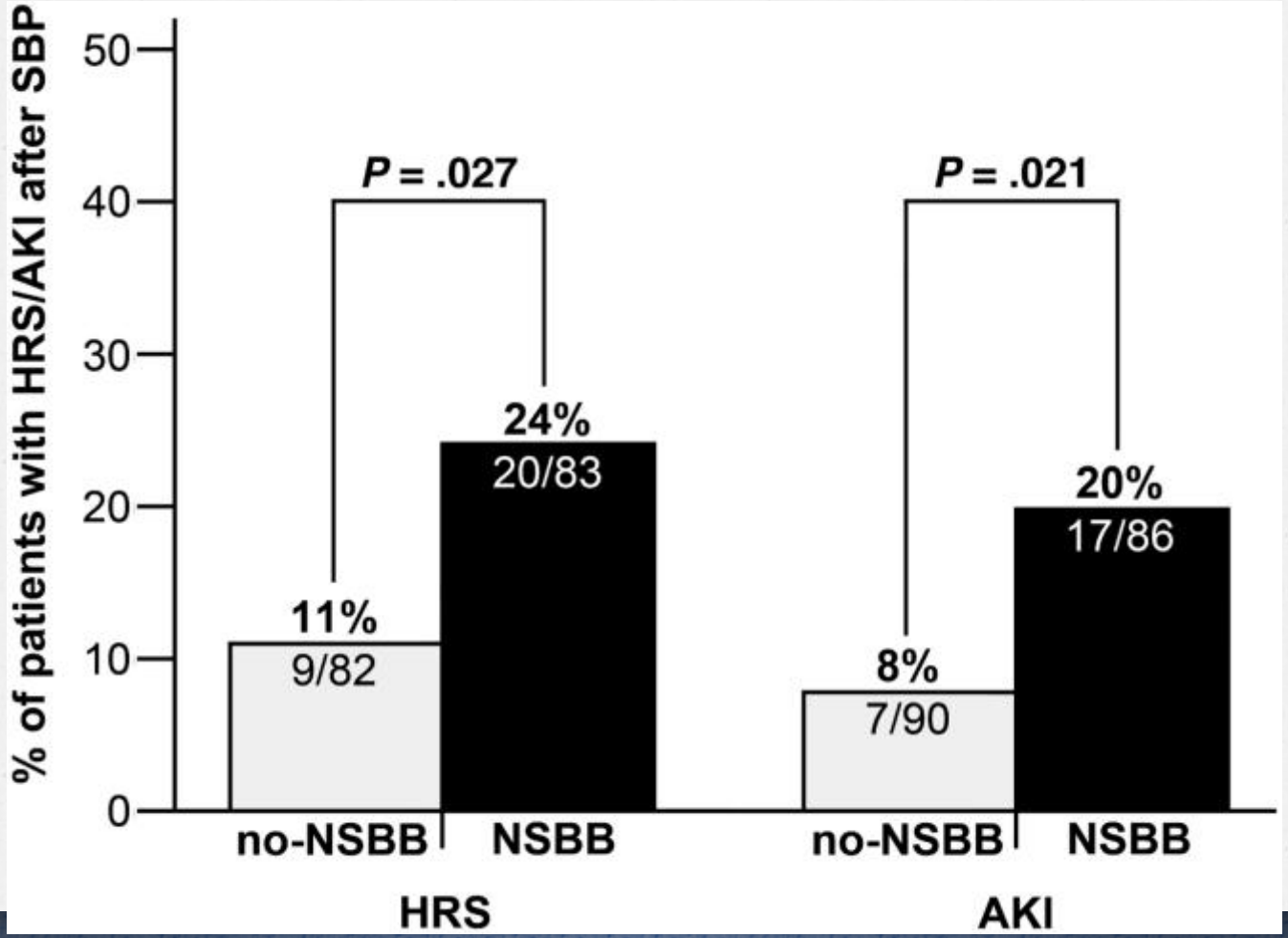
What about beta blockers?

Beta blockers increase risk of death after first episode of SBP



Mandorfer, *Gastro*, 2014.

Beta blockers increase risk of HRS/ AKI after first episode of SBP



Mandorfer, *Gastro*, 2014.

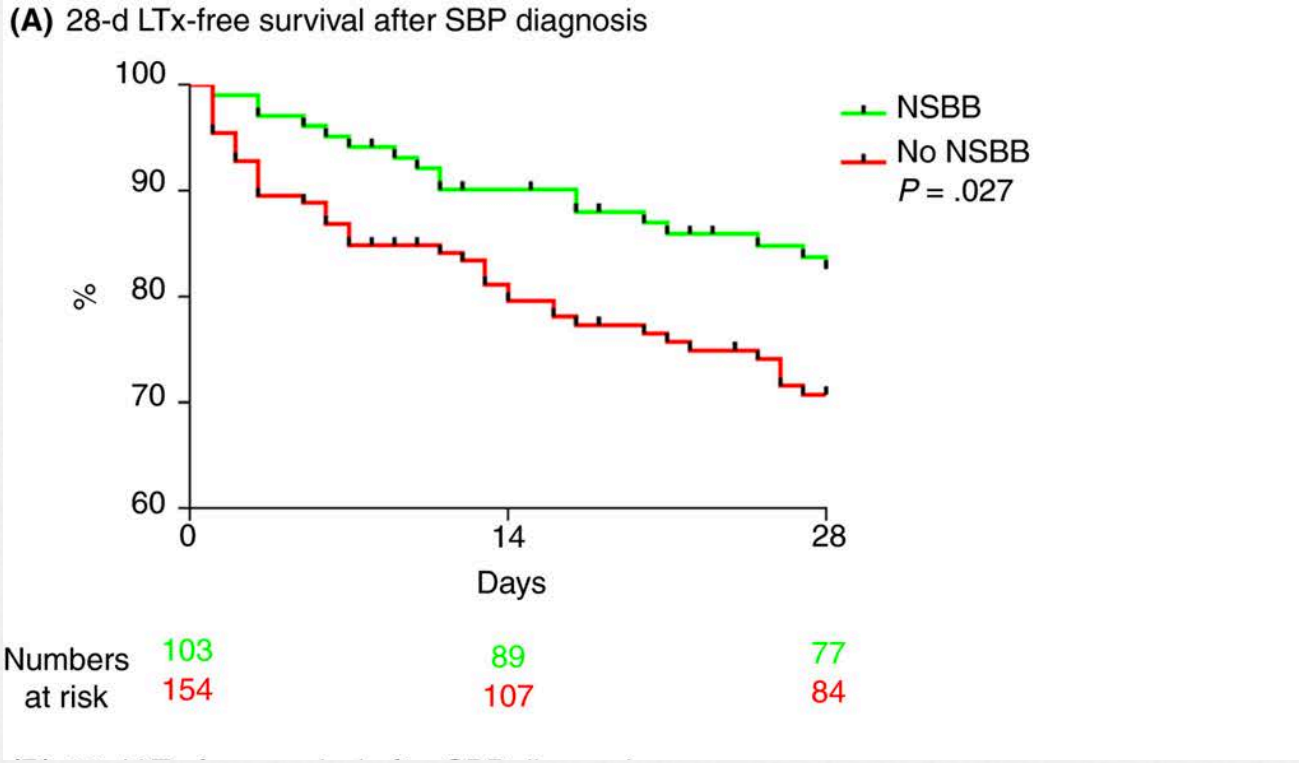
Beta blockers increase risk of HRS/AKI after first episode of SBP

- Patients treated with beta blockers
  - More often Child's C cirrhosis (67 vs 53%)
  - Higher bilirubin (5 vs 3)
- MELD similar between groups

Mandorfer, *Gastro*, 2014.

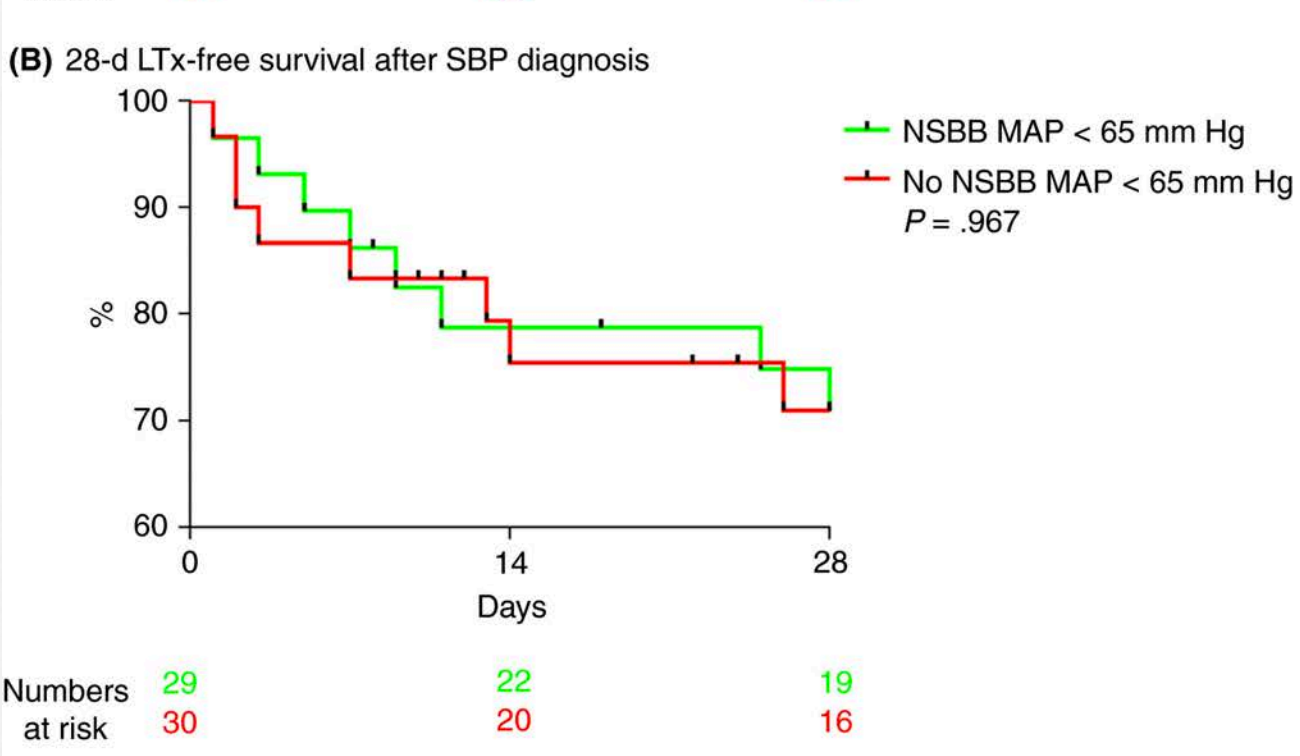
Or do they?

NSBB may be associated with improved survival

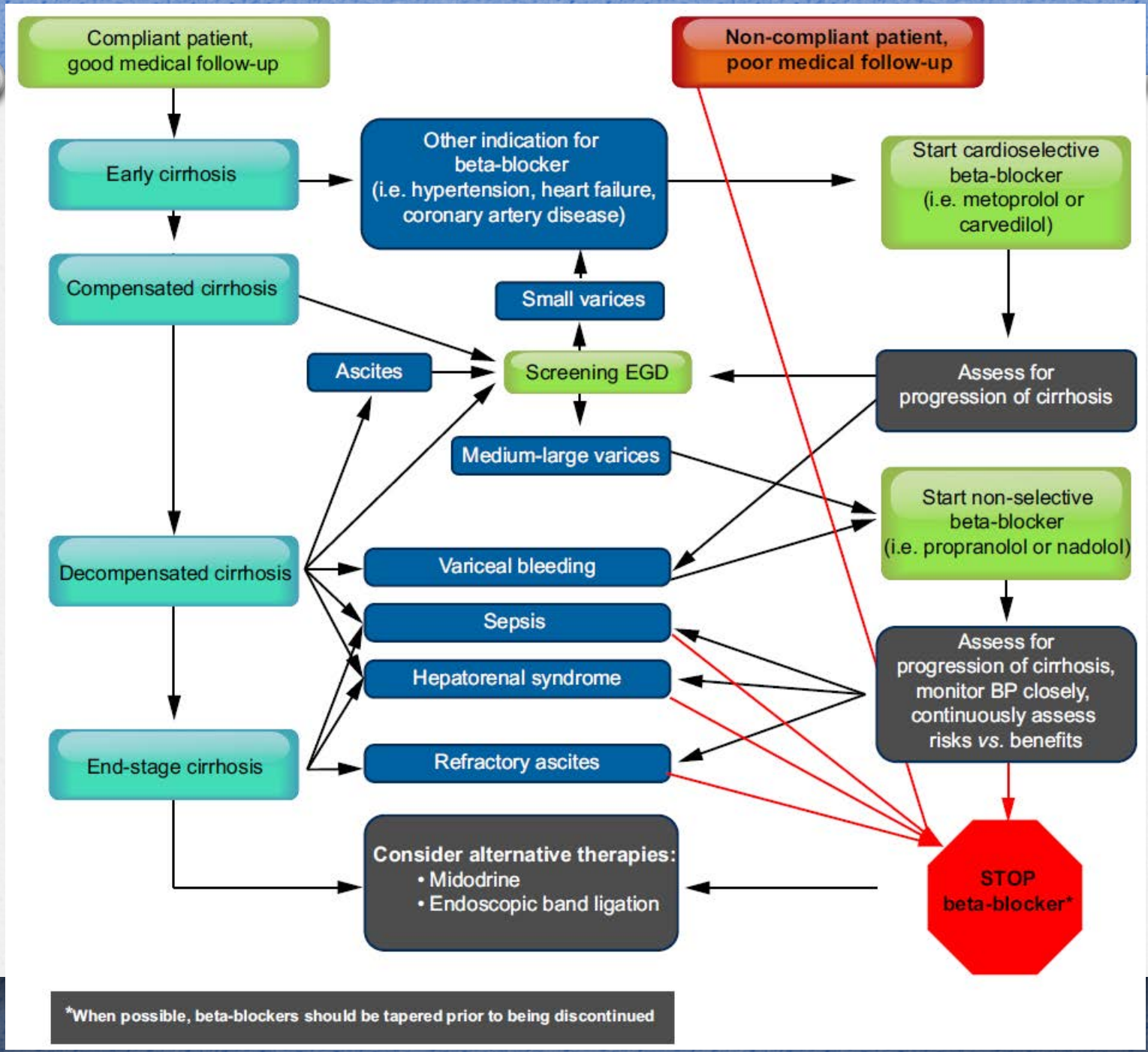


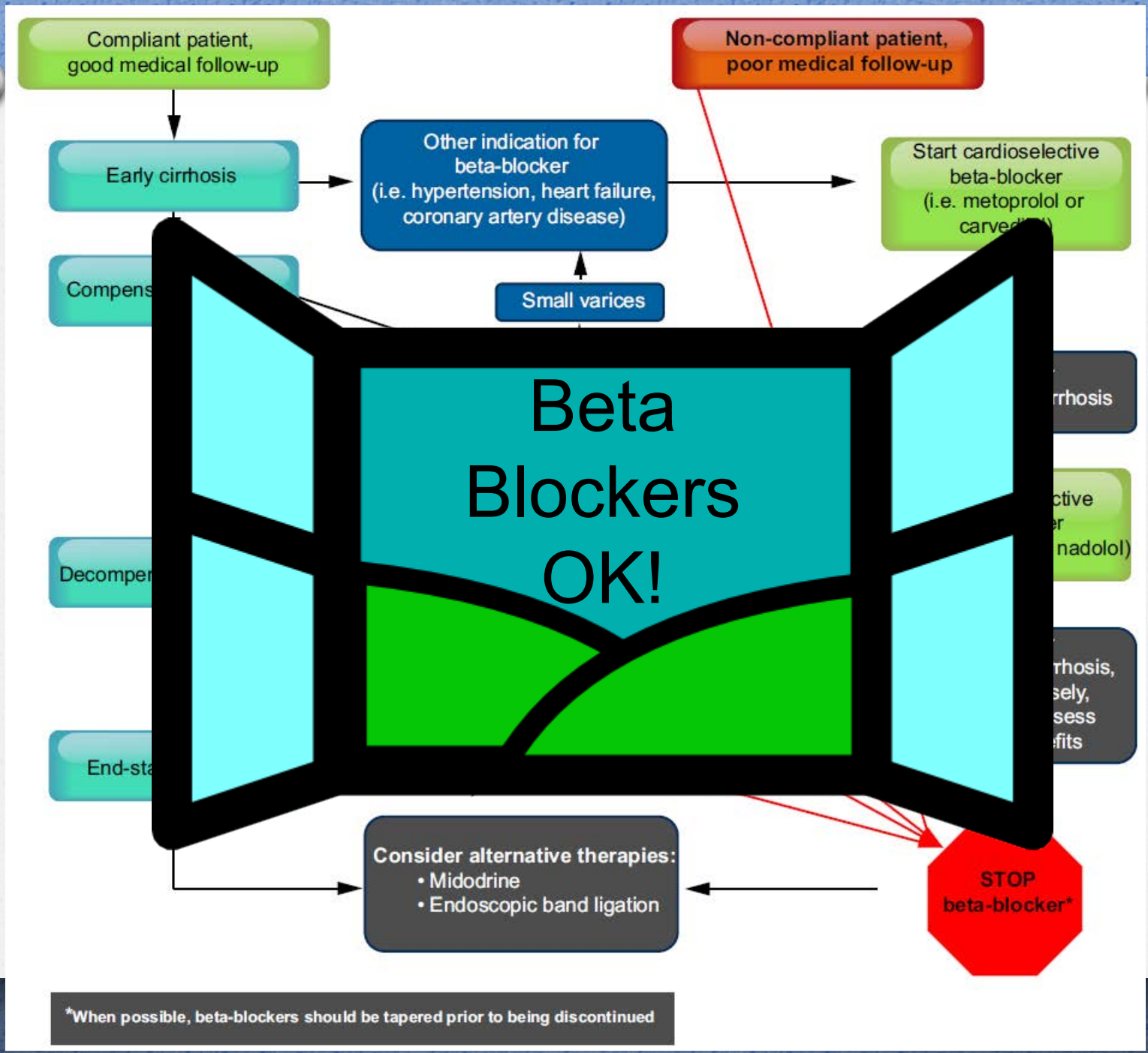
Tergast, *AP&T*, 2019.

Benefit of NSBB lost if MAP<65



Tergast, *AP&T*, 2019.


Compliant patient, good medical follow-up
Non-compliant patient, poor medical follow-up
Early cirrhosis
Other indication for beta-blocker (i.e. hypertension, heart failure, coronary artery disease)
Start cardioselective beta-blocker (i.e. metoprolol or carvedilol)
Compensated cirrhosis
Small varices
Ascites
Screening EGD
Assess for progression of cirrhosis
Medium-large varices
Start non-selective beta-blocker (i.e. propranolol or nadolol)
Decompensated cirrhosis
Variceal bleeding
Sepsis
Hepatorenal syndrome
Assess for progression of cirrhosis, monitor BP closely, continuously assess risks vs. benefits
End-stage cirrhosis
Refractory ascites
Consider alternative therapies:
• Midodrine
• Endoscopic band ligation
STOP beta-blocker*
*When possible, beta-blockers should be tapered prior to being discontinued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SBP prophylaxis

- Indications
  - Primary prophylaxis: low-protein ascites (<1.5) + impaired renal function, Child's C cirrhosis/bilirubin ≥3
  - Secondary prophylaxis

	Antibiotics	Control	RR (95% CI)	ARR/NNT
Overall mortality	16%	25%	0.65 (0.48-0.88)	9%/11
3-month mortality	6.2%	22.3%	0.28 (0.12-0.68)	16.1%/6
Long-term mortality	19.9%	28.5%	0.71 (0.49-1.04)	8.5%/12
SBP	12.7%	25%	0.49 (0.35-0.69)	12%/8

Saab, *AJG*, 2009.

Ascites
Summary

- Ascites in a hospitalized patient should be evaluated
  - Diagnostic paracentesis to establish etiology (1st paracentesis) and rule out infection (all paracentesis)
- SBP should be treated with antibiotics and IV albumin
- SBP prophylaxis should be prescribed for primary and secondary prophylaxis

Case 4

- 54yo woman with NASH cirrhosis is advised by her hepatologist to go to the ED due to abnormal labs

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- 54yo woman with NASH cirrhosis is advised by her hepatologist to go to the ED due to abnormal labs
- She has refractory ascites, and requires therapeutic paracentesis every 2 weeks

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- 54yo woman with NASH cirrhosis is advised by her hepatologist to go to the ED due to abnormal labs
- She has refractory ascites, and requires therapeutic paracentesis every 2 weeks
- VS: T 37 HR 80 BP 109/65 RR 12 SpO2 98%
- Abd: Distended with dullness to percussion
- CBC at baseline, Na 131, Cr 1.8, tbili 6, INR 2
- Baseline Cr 0.6

AKI in cirrhosis

International Ascites Club criteria

Subject	Definition		
Baseline sCr	• sCr obtained within 3 months prior to admission • If >1 value within the previous 3 months, the value closest to the admission • If no previous sCr, the sCr on admission should be used		
Definition of AKI	• Increase in sCr ≥0.3 mg/dl (≥26.5 µmol/L) within 48 hours or • Increase sCr ≥50% within the prior 7 days		
Staging of AKI	Stage **1A** (sCr <1.5mg/dl)* Stage **1B** (sCr ≥1.5mg/dl)*		
	• **Stage 2**: increase in sCr >2-fold to 3-fold from baseline • **Stage 3**: increase of sCr >3-fold from baseline or sCr ≥4.0 mg/dl (353.6 µmol/L) with acute increase ≥0.3 mg/dl (≥26.5 µmol/L) or initiation of renal replacement therapy		
Progression of AKI	**Progression** Progression of AKI to a higher stage and/or need for RRT	**Regression** Regression of AKI to a lower stage	
Response to treatment	**No response** No regression of AKI	**Partial response** Regression of AKI stage with a reduction of sCr to ≥0.3 mg/dl (≥26.5 µmol/L) above baseline	**Full response** Return of sCr to a value within 0.3 mg/dl (≥26.5 µmol/L) of baseline

Angeli, *Gut*, 2015.

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Angeli, *Gut*, 2015.

Management of AKI

- Investigate non-HRS causes:
  - Review medication history: diuretic dose change or initiation, NSAIDs or other nephrotoxic drugs, iodinated contrast
  - Urinalysis with microscopy
  - Renal ultrasound
- Evaluate for infection
- Administer volume expansion: IV albumin 1g/kg x 2 days

Hepatorenal syndrome (HRS)
International Ascites Club Criteria

- Cirrhosis with ascites
- AKI as defined by ICA-AKI criteria
- No response after 2 consecutive days of diuretic withdrawal and volume expansion
- Absence of shock
- No nephrotoxins
- No signs of structural kidney injury
  - Urine protein <500mg/day
  - No microscopic hematuria
  - Normal renal ultrasound

Angeli, *Gut*, 2015.

Hepatorenal syndrome (HRS)
International Ascites Club Criteria

- Type 1 HRS: HRS-AKI
- Type 2 HRS: renal impairment meets HRS criteria but not AKI

Angeli, *Gut*, 2015.

Hepatorenal syndrome

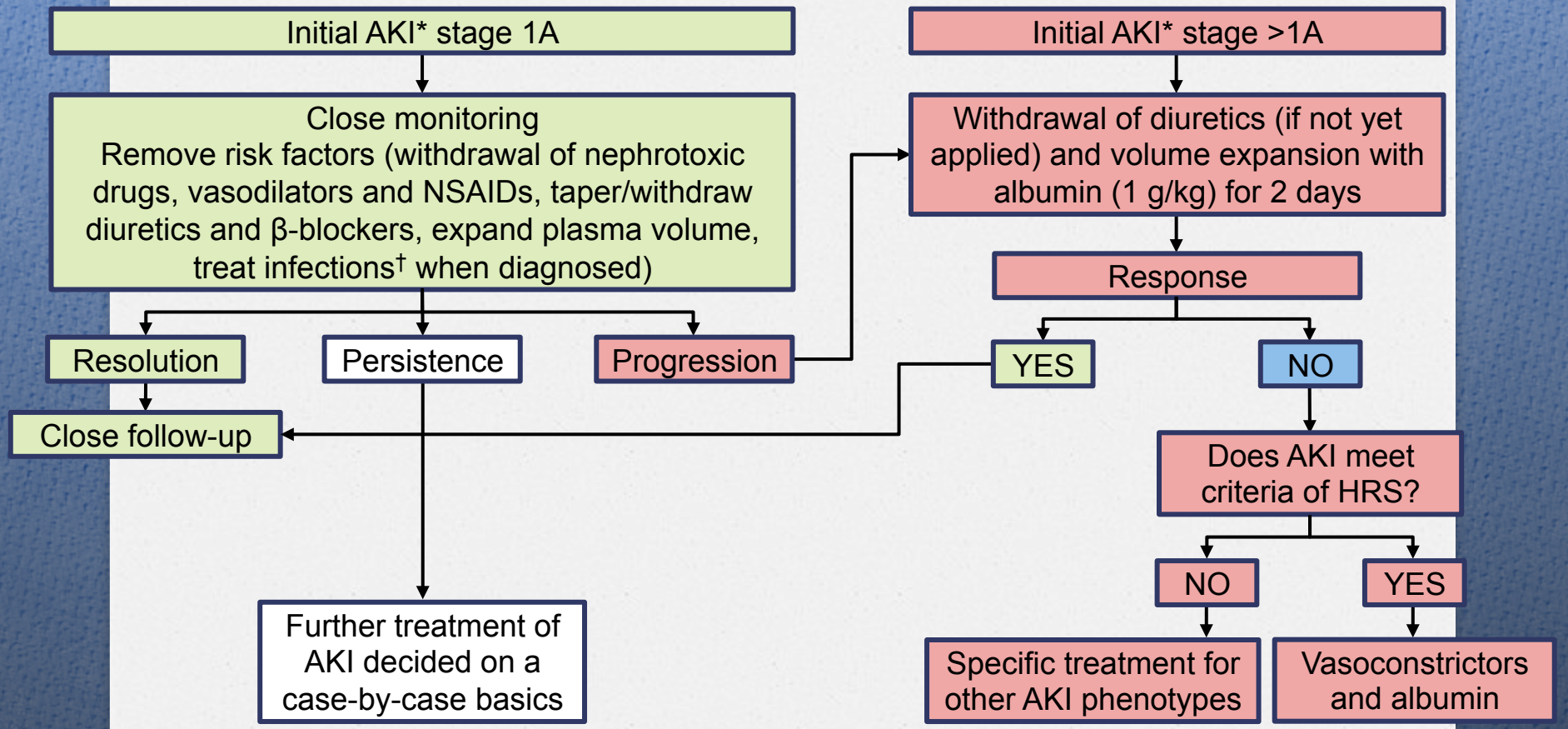
- Occurs in ~20% of patients with advanced liver disease
- Poor prognosis
  - Median survival 8-10 days
  - 3-month survival: 15%
- Common precipitants: infection, GI bleeding, LVP
- Can be reversible with timely liver transplantation

Fabrizi, *Clin Liver Dis*, 2017.

Treatment of hepatorenal syndrome

- Vasoconstriction of systemic and splanchnic circulation to improve effective circulating volume and renal perfusion
  - Drugs studied include midodrine + octreotide, norepinephrine, or terlipressin
    - Most recent meta-analyses suggest terlipressin superior to placebo with resolution of HRS in 40-50%
- Albumin dose of 20-40g/day

ICA management of AKI in cirrhosis

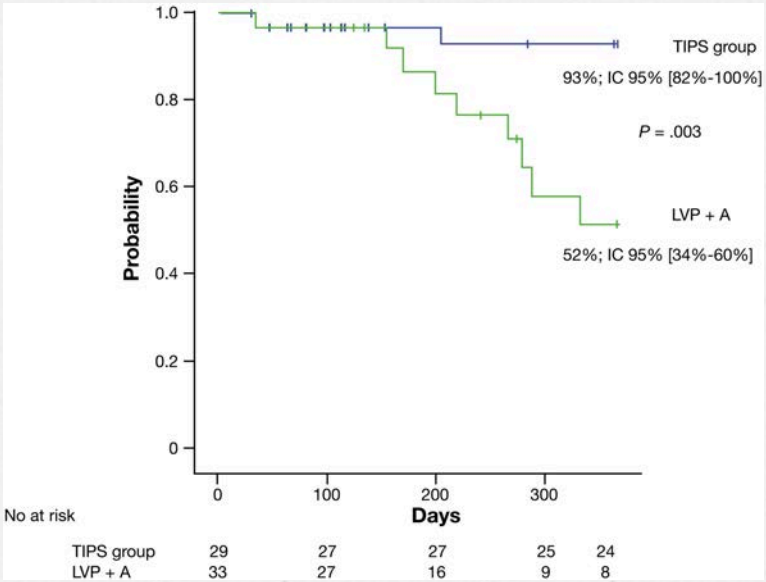


EASL
The Home of Hepatology

Refractory ascites

- Definition: ascites that is resistant to diuretics OR management with diuretics results in complications that prevent diuretic dose increase
- Median survival 6 months

TIPS vs. serial paracentesis



LT-free Survival

Predictors of mortality

	HR	95% CI
TIPS	0.61	0.41-0.91
Age	1.024	1.001-1.048
Bilirubin	1.22	1.029-1.46
Sodium	0.95	0.92-0.99

Bureau, *Gastro*, 2017.

Boyer, *Hepatology*, 2010.
Salerno, *Gastro*, 2007.

TIPS vs. serial paracentesis

- Incidence of hepatic encephalopathy is similar between TIPS vs paracentesis groups, though severe HE may be more common with TIPS

Bureau, *Gastro*, 2017.

Boyer, *Hepatology*, 2010.
Salerno, *Gastro*, 2007.

TIPS vs. serial paracentesis

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Most other portal hypertensive complications improve with TIPS

	TIPS	LVP
Total	15%	28%
GI bleeding	8%	13%
SBP	2%	3%
HRS	5%	13%

Bureau, *Gastro*, 2017.

Boyer, *Hepatology*, 2010.
Salerno, *Gastro*, 2007.

Contraindications to TIPS

Relative	Absolute
Hepatocellular carcinoma, especially centrally located	Primary prevention of variceal bleeding
Obstruction of all HVs	Congestive heart failure
PV thrombosis	Severe tricuspid regurgitation
Moderate pulmonary hypertension	Severe pulmonary hypertension
Severe coagulopathy (international normalized ration >5)	Multiple hepatic cysts
Thrombocytopenia of <20,000 cells/cm^3	Uncontrolled systemic infection or sepsis
Hepatic encephalopathy	Unrelieved biliary obstruction

MELD >15-18 and/or total bilirubin >3

Patidar, *Clin Liver Dis*, 2014.

Case 5

- 60F with NASH cirrhosis presents with jaundice and worsened fluid retention

Case 5

- 60F with NASH cirrhosis presents with jaundice and worsened fluid retention
- Exam:
  - VS: T 38, HR 110, BP 95/50, RR 20, 97%RA
  - Jaundiced
  - Abdominal distension with dullness to percussion
  - Confused, slow to respond

Case 5 (cont'd)

Labs

	6 weeks ago	Current presentation
INR	1.3	2.5
Na	140	134
Cr	0.6	2.3
Total bilirubin	1.0	5.2
Albumin	4.0	3.3
MELD-Na	9	32

Acute on Chronic Failure

Acute on Chronic Failure: Consensus Definition

"A syndrome in patients with chronic liver disease with or without previously diagnosed cirrhosis which is characterized by acute hepatic decompensation resulting in:

1) liver failure (jaundice and elevated INR) *and*

2) one or more extrahepatic organ failures that is associated with increased mortality within a period of 28 days and up to 3 months from onset"

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Acute on Chronic Liver Failure (ACLF)

- 32,335 hospitalizations for ACLF per year
- Mortality 50% (previously 65%)
- Mean length of stay: 16 days
- Indicates need for liver transplantation
  - Presence may increase risk of post-transplant morbidity and mortality

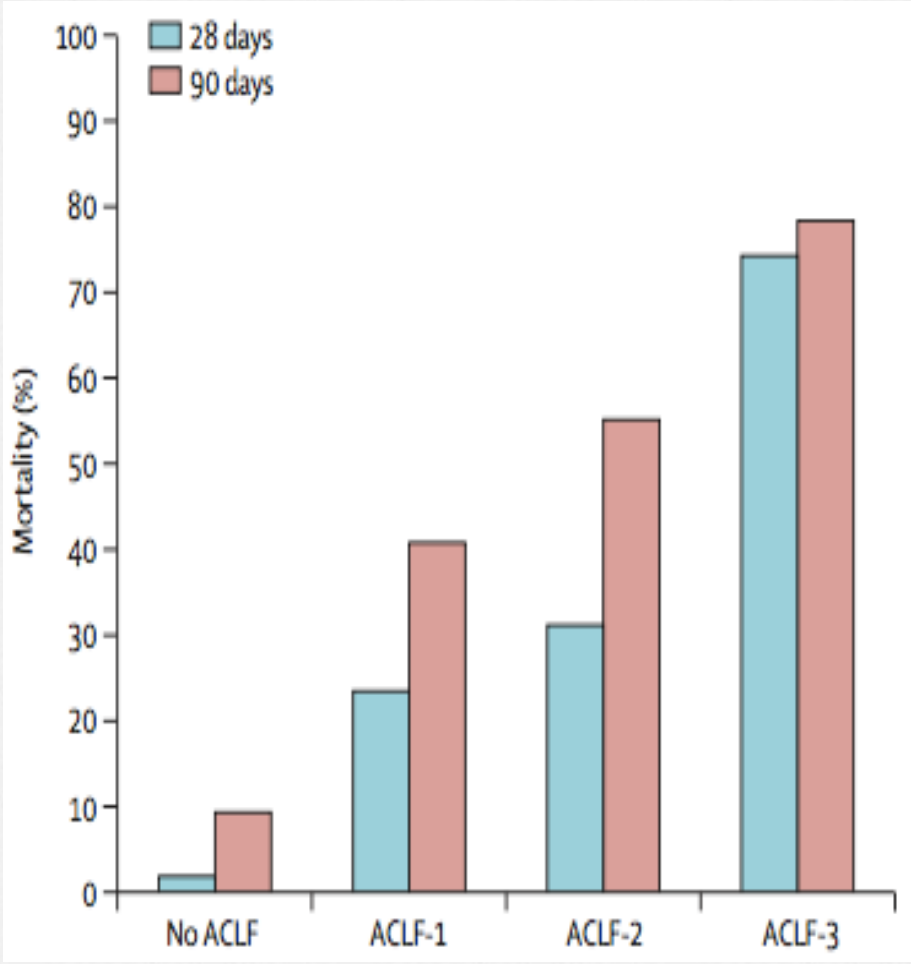
Allen, *Hepatology* 2016.
Huebener, *J Hepatol*, 2018.

Chronic Liver Failure Consortium Organ Failure Score (CLIF score)

Organ System	Score		
	1	2	3
Liver	6.0 mg/dL		
Renal	Cr 2.0 mg/ dL		RRT
Neurologic	Hepatic encephalopathy grade		
Hematologic	INR 2.0		
Circulatory	MAP <70		Vasopressors
Respiratory	PaO2/FiO2 <300		

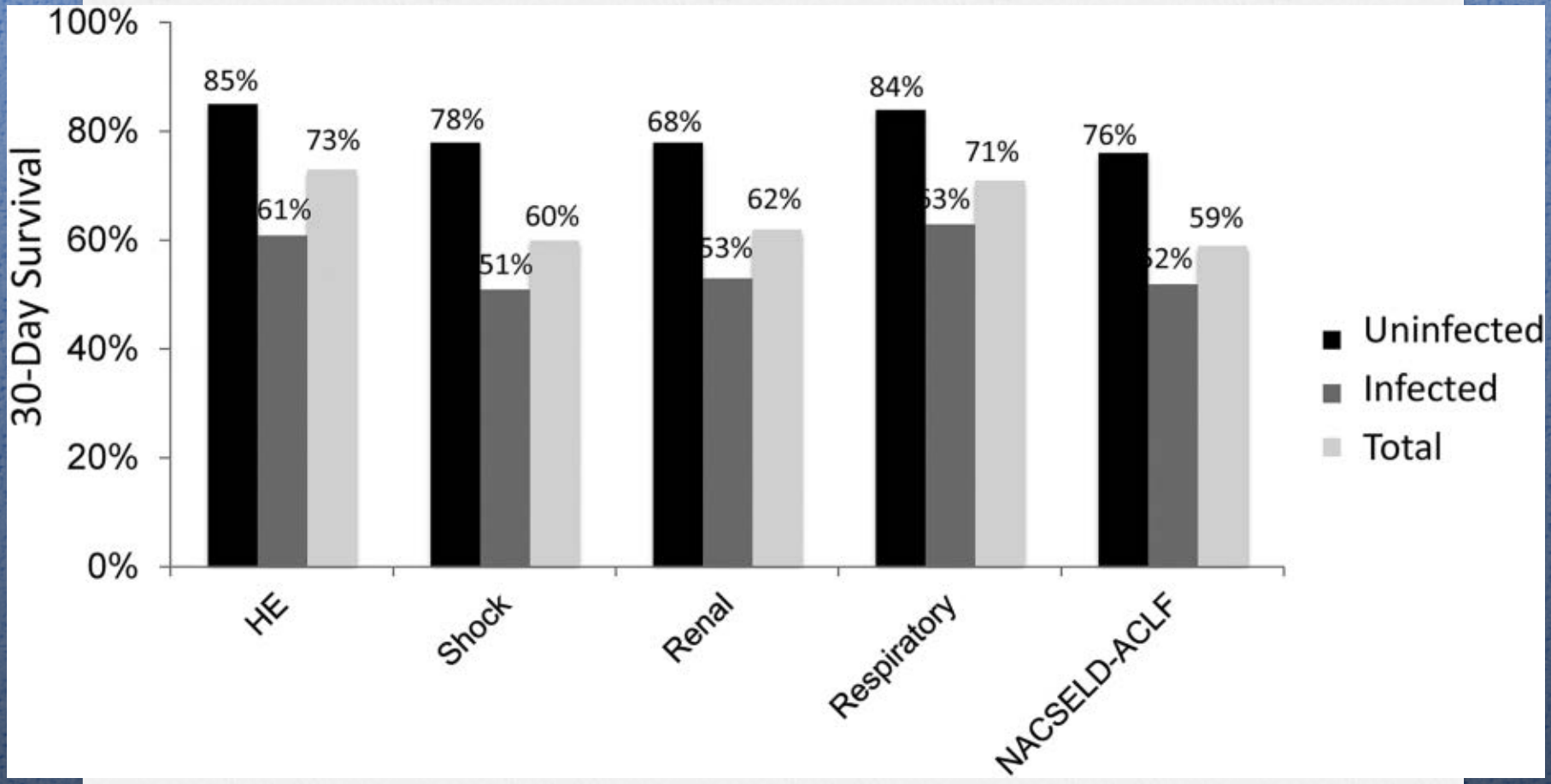
Bernal, Lancet 2015.

ACLF strongly predicts 28- and 90-day mortality



Bernal, Lancet 2015.

Infection is associated with increased risk of 30-day mortality



O'Leary J et al. *Hepatology* 2018; 2367-2374.

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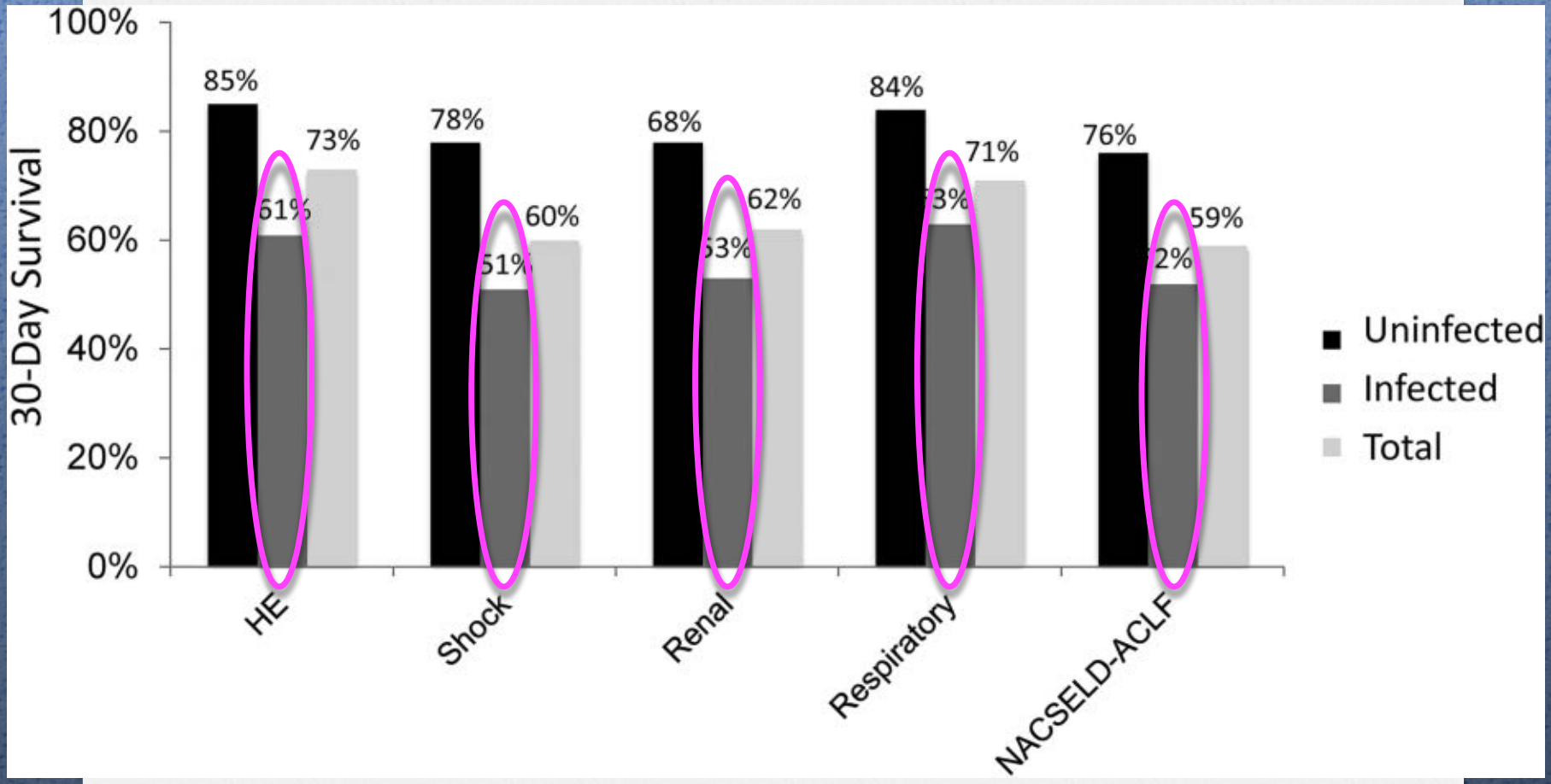

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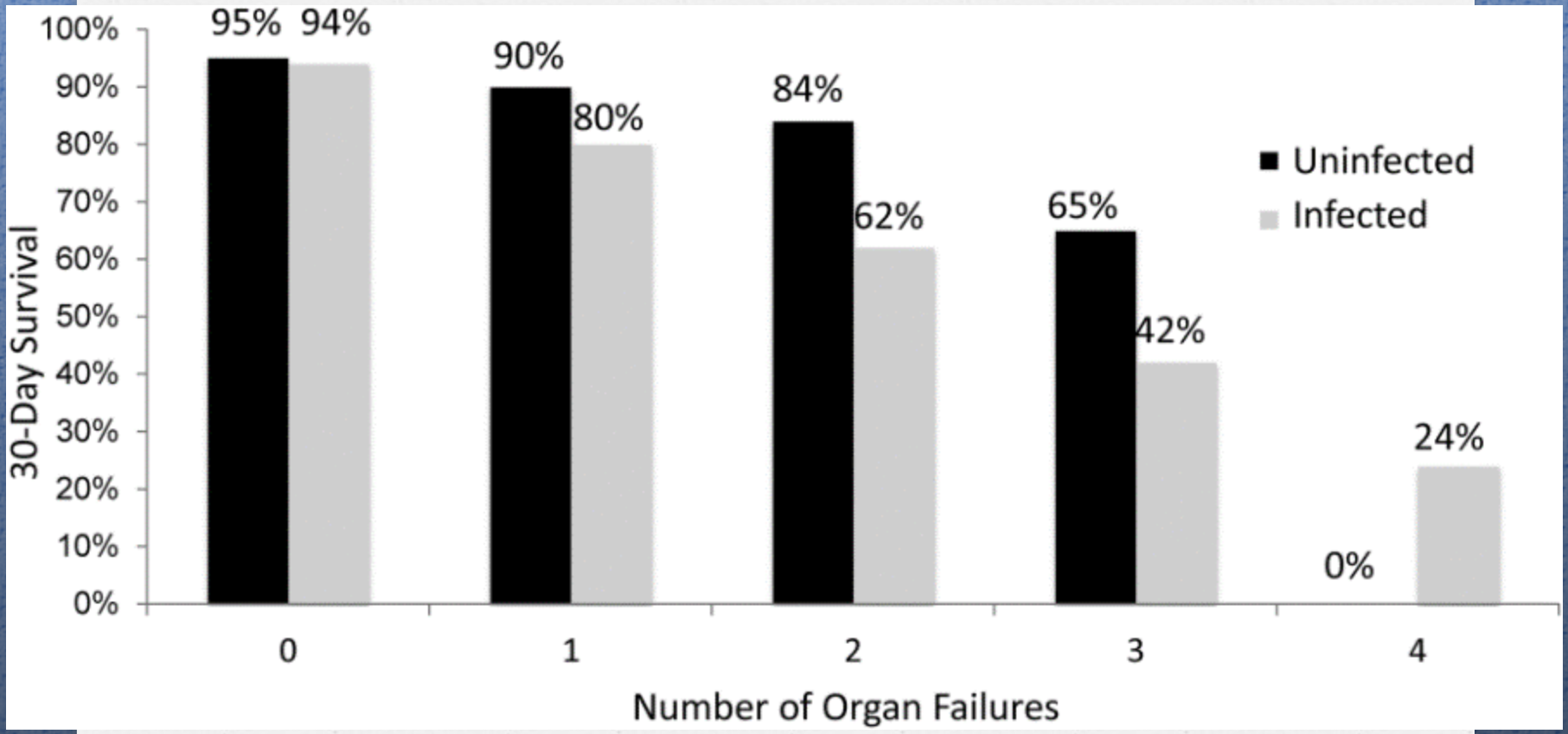
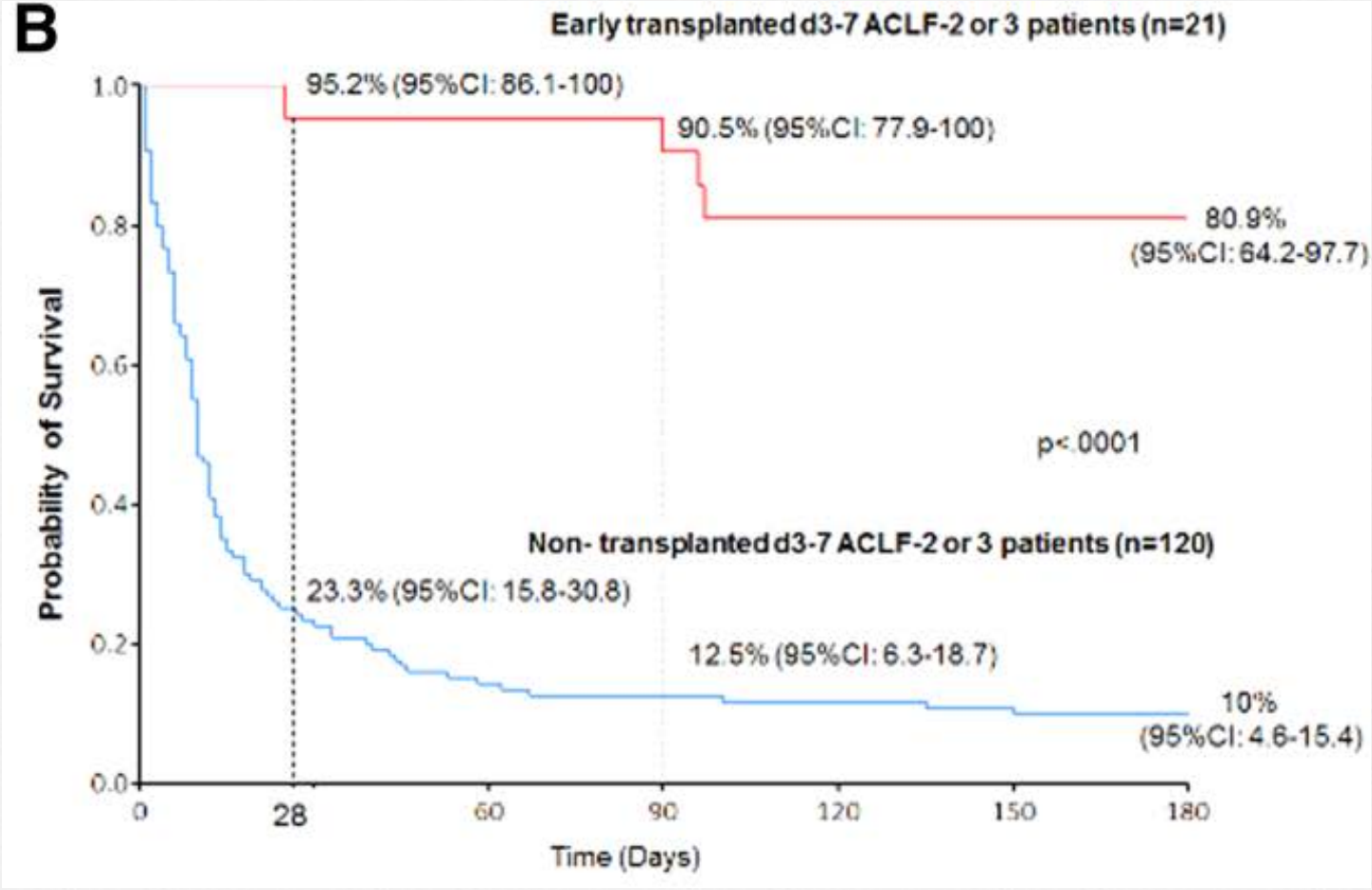


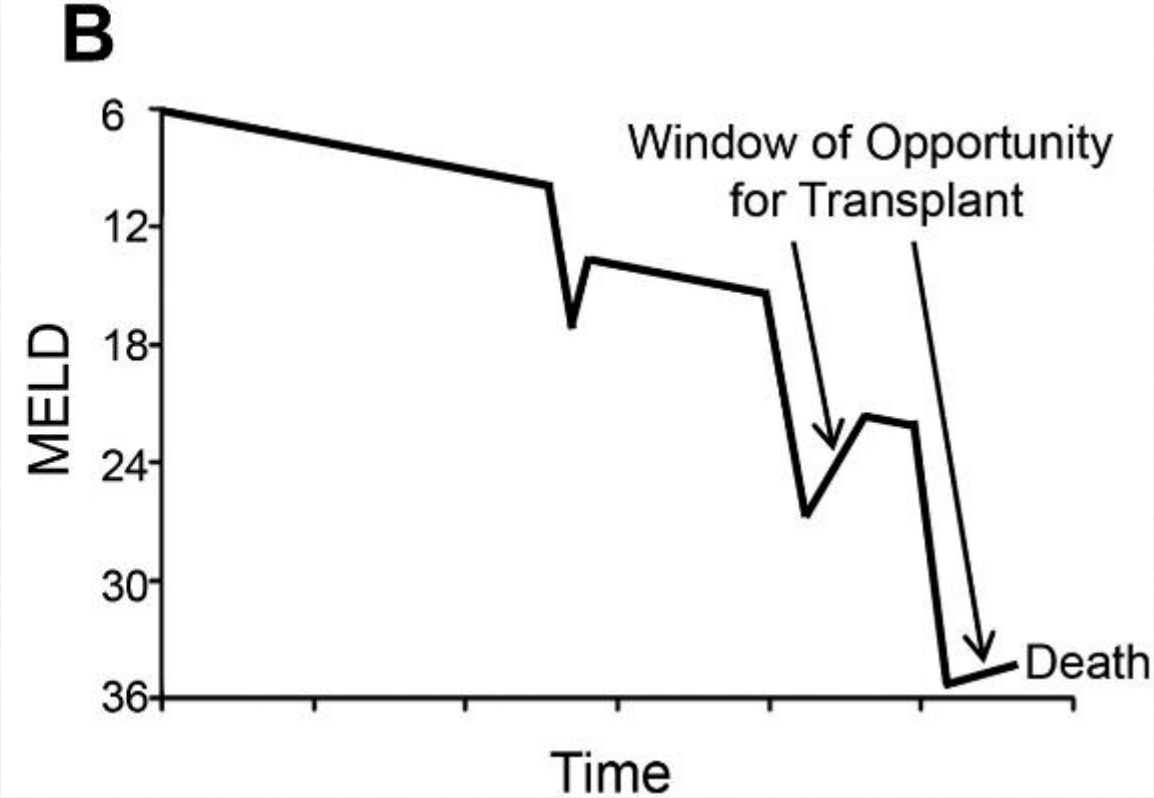
O'Leary J et al. *Hepatology* 2018; 2367-2374.

LT improves survival in ACLF



Gustot, *Hepatology,* 2015.

Narrow window for LT in ACLF



Asrani, *Clin Liver Dis,* 2014.

When should you consult hepatology for a patient with cirrhosis?

When should you consult hepatology for a patient with cirrhosis?

- Decompensated cirrhosis or ACLF
  - Assistance in management
  - Liver transplant evaluation
- When TIPS is being considered
- Evaluation of a liver mass
- Variceal bleeding (center variability)

Indications for liver transplant evaluation in patients with cirrhosis

- Decompensated cirrhosis
  - Child's B cirrhosis and/or
  - MELD>14
- Hepatocellular carcinoma

Potential barriers to liver transplant

- Medical
  - Severe uncontrolled extrahepatic disease
  - Critical illness: pressor and/or ventilator dependence
  - Obesity class III
  - Impaired functional status
- Surgical
  - Portal and/or mesenteric vein thrombosis
  - Prior complex abdominal surgery

Specific selection criteria vary across transplant centers

Potential barriers to liver transplant

- Psychosocial
  - Active substance use/abuse
  - Lack of reliable transportation or social support
  - Lack of adequate insurance

Specific selection criteria vary across transplant centers

Acute on Chronic Liver Failure

Summary

- Acute on chronic liver failure is associated with high risk of mortality
  - Mortality risk worsened with infection and number of organ systems failing
- Liver transplant improves survival and should be considered early
  - Consult your local hepatologist early

Quality measures in cirrhosis

1	Patients with ascites who are admitted to the hospital for evaluation and management of symptoms related to ascites or encephalopathy should receive a diagnostic paracentesis during the index hospitalization
2	Patients who are admitted with or develop GI bleeding should receive antibiotics within 24 hours of admission or presentation. Antibiotics should be continued for at least 5 days
3	Patients undergoing large-volume paracentesis (> 5 L removed) should receive intravenous albumin (6-8 g/L removed)
4	Hospitalized patients with ascites, with an ascitic fluid polymorphonuclear count of ≥ 250 cells/mm^3, should receive empiric antibiotics and albumin within 12 hours of the test result. The first dose of albumin should be 1.5 g/kg of body weight followed by a second infusion of 1.0 g/kg on day 3
5	Patients with ascites and/or hepatic hydrothorax should be managed with both sodium restriction and diuretics
6	Patients who undergo paracentesis should not receive fresh frozen plasma or platelets
7	Patients with cirrhosis, with platelet count < 150,000/mm^3 or liver stiffness measurement > 20 kPa, and no documentation of previous GI bleeding, should receive upper endoscopy to screen for varices within 12 months of cirrhosis diagnosis
8	Patients with decompensated cirrhosis and no documented history of previous GI bleeding should receive upper endoscopy to screen for varices within 3 months of cirrhosis diagnosis
9	Patients with cirrhosis, no documented history of previous GI bleeding, and medium/large varices on endoscopy should receive either nonselective β-blockers or EVL within 1 month of varices diagnosis
10	Patients with cirrhosis who present with upper GI bleeding should receive upper endoscopy within 12 hours of presentation
11	Patients with cirrhosis who are found to have bleeding esophageal varices should receive EVL or sclerotherapy at the time of index endoscopy
12	Patients with cirrhosis who survive an episode of acute variceal hemorrhage should receive a combination of EVL and β-blockers
13	Patients with previous overt hepatic encephalopathy should be counseled regarding the risks associated with driving
14	Patients with hepatic encephalopathy should have a search for evidence of precipitating factors documented in the chart
15	Patients who are hospitalized and have an acute episode of overt hepatic encephalopathy should receive lactulose
16	Patients who are discharged after an acute episode of hepatic encephalopathy should receive secondary prophylaxis with lactulose and/or rifaximin
17	Patients with cirrhosis and MELD score ≥ 15, who do not have absolute contraindications to liver transplantation, should have documentation of evaluation for liver transplantation
18	Patients with cirrhosis, who do not have absolute contraindications to liver transplantation and have HCC meeting the transplant criteria, should be considered for liver transplantation, regardless of their MELD score
19	Patients with cirrhosis should undergo HCC screening using abdominal imaging with or without serum α-fetoprotein every 6-12 months
20	Patients with cirrhosis should have hepatitis B immune status and/or vaccination documented in the chart
21	Patients with untreated hepatitis C cirrhosis should be considered for antiviral therapy for hepatitis C
22	Patients with untreated hepatitis B cirrhosis should be considered for antiviral therapy for hepatitis B
23	Patients with cirrhosis should receive counseling or be referred to a substance abuse treatment program within 2 months of positive screening
24	Patients with cirrhosis who are undergoing abdominal surgery should have documentation of the risk–benefit of undergoing the surgical procedure in the medical record
25	Recently discharged patients with cirrhosis should have a clinic visit with a health care provider within 4 weeks of discharge
26	Patients with cirrhosis should be assessed for frailty using a systematic screening method

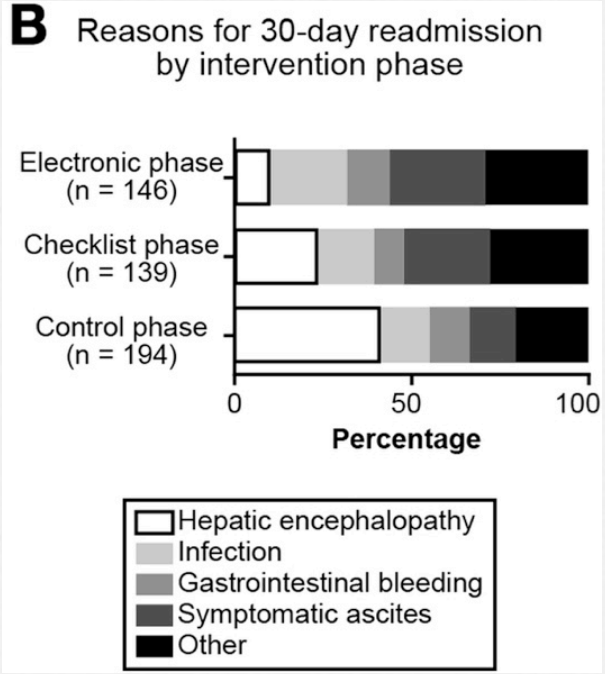
Kanwal, *Hepatology,* 2019.

A Quality Improvement Initiative Reduces 30-Day Rate of Readmission for Patients With Cirrhosis

Elliot B. Tapper,* Daniel Finkelstein,‡ Murray A. Mittleman,§ Gail Piatkowski,‖ Matthew Chang,¶ and Michelle Lai*

Clinical Gastroenterology and Hepatology 2016;14:753–759

- Paper checklist then electronic checklist approach to implement evidence-based care
  - HE: Rifaximin for all + goal-directed lactulose dosing
  - SBP treatment: timely antibiotics + IV albumin
  - Prophylactic measures



Thank you

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