

Kdy „přes furosemid“ k dialýze – kdy zahájit RRT?

Pavel Dostál

Klinika anesteziologie, resuscitace a intenzivní medicíny
Univerzita Karlova, Lékařská fakulta v Hradci Králové
Fakultní nemocnice Hradec Králové



Okruhy

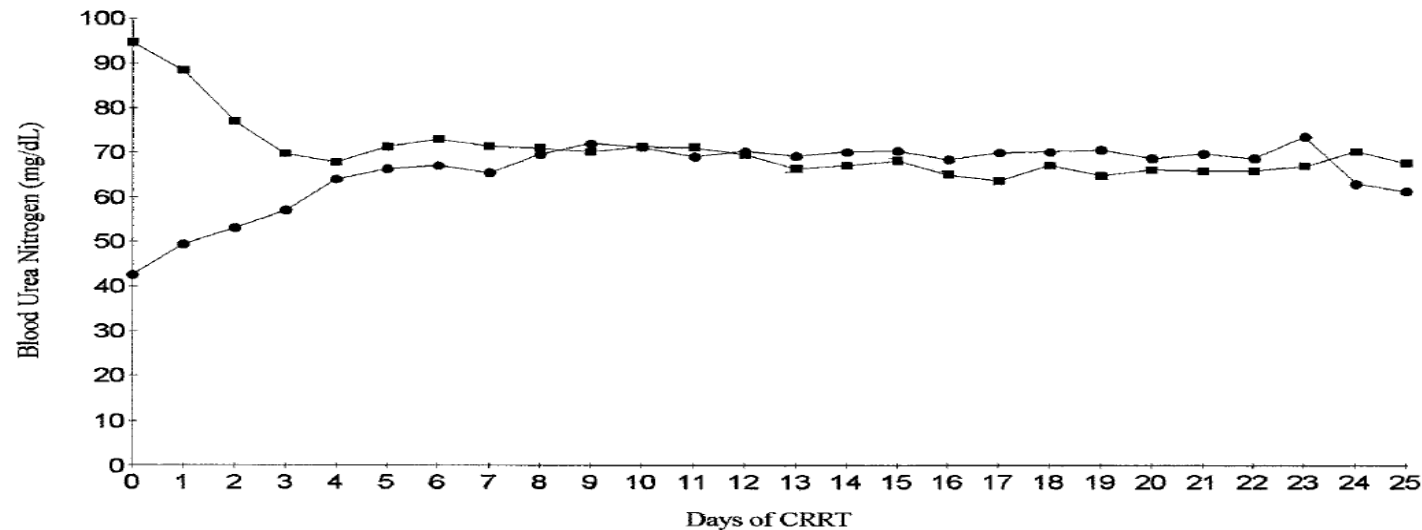
- Absolutní a relativní indikce RRT, timing zahájení
- Volba metody – kontinuální, intermitentní, jiná
- Jak dlouho ev. pokračovat v CRRT?
- Jaká dávka?

Kdy začít?



Kdy začít?

- Pozdní zahájení
- 20.3 % přežití



- Časné zahájení
- 39.0 % přežití



Nemocí s poúrazovým ARF

Gettings LG et al.
Intensive Care Med 25:805-813, 1999



Časné zahájení RRT

- Nižší výskyt metabolické acidózy
 - Vyšší výskyt/progrese hypotenze
 - Trend k nižší smrtnosti?
 - Rychlejší obnovení funkce ledvin?
 - Vyšší pravděpodobnost obnovení funkce ledvin?
-
- Benefit metody vs vliv selekce nemocných

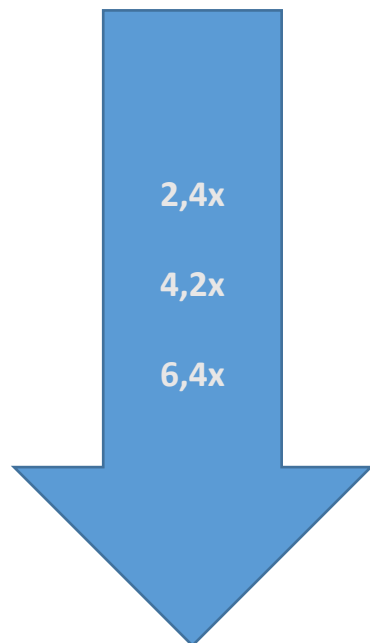
„Tradiční“ kritéria pro náhradu renálních funkcí

- Oligurie, anúrie (24-48h)
- $\text{Urea}_s > 35 \text{ mmol/l}$
- $\text{Kreatinin}_s > 400 \text{ (600 } \mu\text{mol/l)}$
- $\text{K}^+ > 6,5 \text{ mmol/l}$
- Hyperhydratace rezistentní na terapii diuretiky
- Metabolické poruchy
 - Metabolická acidóza
 - Hyperfosfatémie
 - Hyperkalcémie
 - Intoxikace dialyzovatelnými toxiny
 - Symptomy urémie

Alternativní kritéria

- Absolutní indikace
 - Hyperkalemie
($> 6,5 \text{ mmol/l}$)
 - Acidóza
($\text{pH} < 7,20 - 7,25$; $\text{BE} < - 8$)
 - Refrakterní hypervolémie
 - Příznaky urémie
 - Perikarditida
 - Neurologické symptomy
 - Peritonitis
 - Krvácivé příznaky
- Relativní indikace
 - Elektrolytové poruchy
 - Hyponatremie
 - Hyperkalemie
 - Oligurie/anuria déle než 12h
 - Azotémia
Urea $> 35 \text{ mmol/l}$
 - Rychlý vzestup kreatininu
 $> 100 \mu\text{mol/l}$ za den

AKIN nebo RIFLE



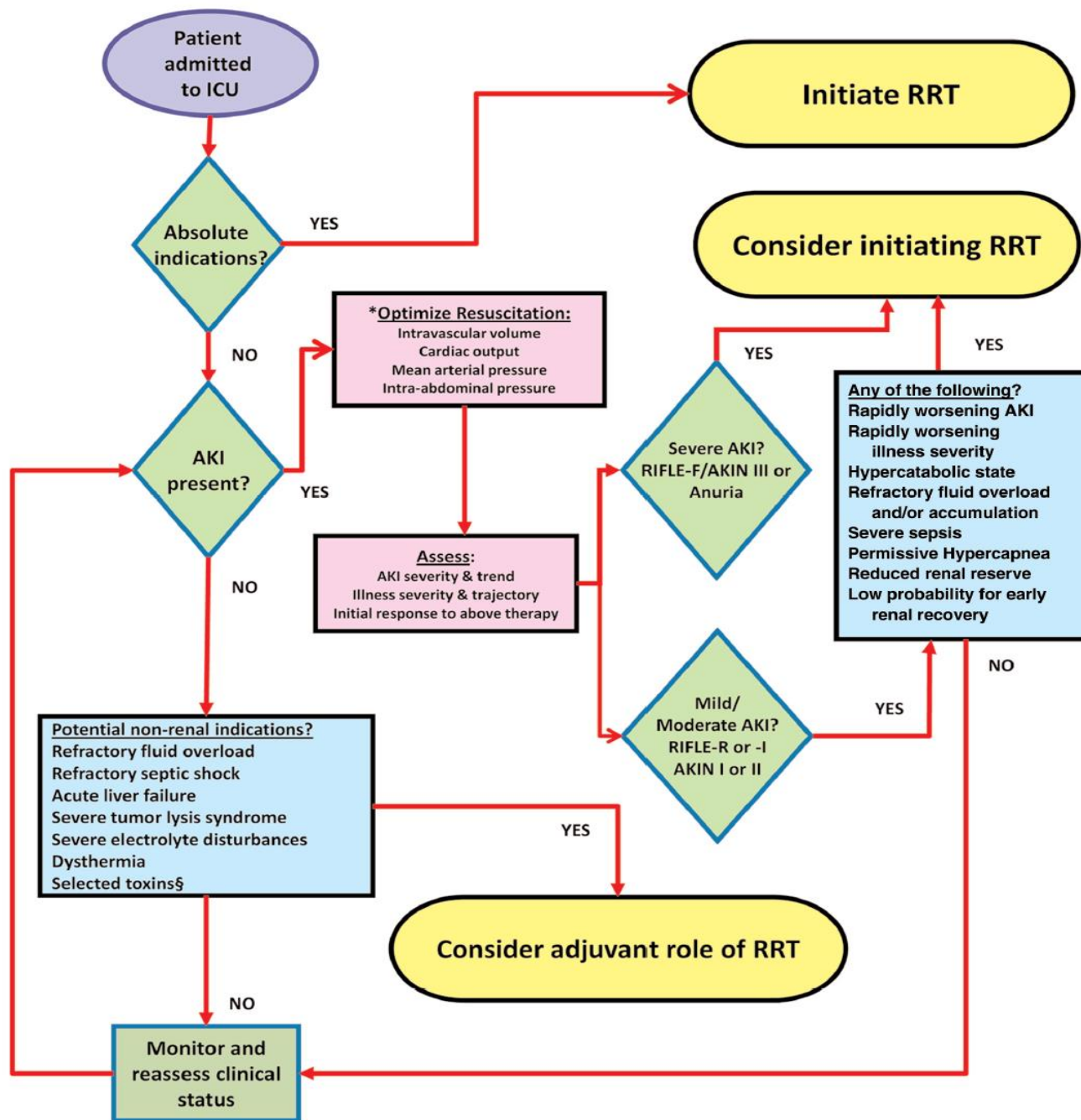
RIFLE

	Cr/ GFR Criteria	Urine Output (UO) Criteria
<u>R</u> isk	Increased Cr x1.5 or GFR decreases >25%	UO <0.5 ml/kg/hr x 6 hr
<u>I</u> njury	Increased Cr x 2 or GFR decreases >50%	UO <0.5 ml/kg/hr x 12 hr
<u>F</u> ailure	Increased Cr x 3 or GFR decreases >75% or Cr ≥ 4 mg/dl (with acute rise of ≥ 0.5 mg/dl)	UO <0.3 ml/kg/hr x 24 hr or anuria x 12 hr
<u>L</u> oss	Persistent ARF = complete loss of renal function for > 4 weeks	
<u>E</u> SRD	End Stage Renal Disease	

AKIN

	Cr Criteria	Urine Output (UO) Criteria
Stage 1	Increased Cr x1.5 or ≥0.3 mg/dl	UO <0.5 ml/kg/hr x 6 hr
Stage 2	Increased Cr x 2	UO <0.5 ml/kg/hr x 12 hr
Stage 3	Increased Cr x 3 or Cr ≥ 4 mg/dl (with acute rise of ≥ 0.5 mg/dl)	UO <0.3 ml/kg/hr x 24 hr or anuria x 12 hr

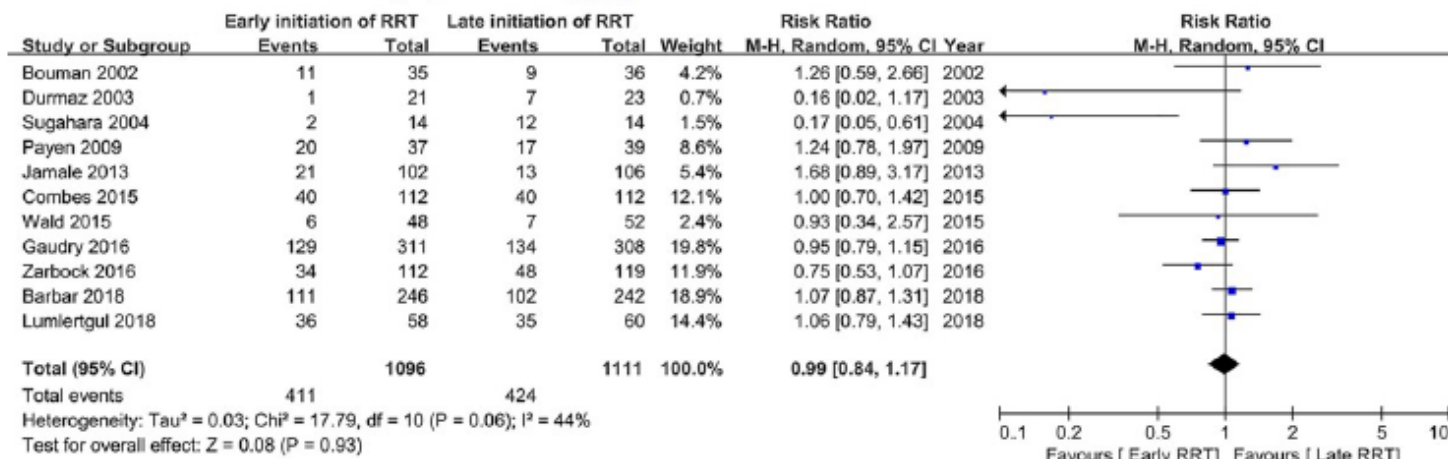
Patients who receive renal replacement therapy (RRT) are considered to have met the criteria for stage 3 irrespective of the stage that they are in at the time of commencement of RRT.



A summary of absolute or 'rescue therapy' indications for initiation of renal replacement therapy in critically ill patients

Category	Characteristic
Metabolic	
Azotemia	Serum urea ≥ 36 mmol/L (100 mg/dL)
Uremic complications	Encephalopathy, pericarditis, bleeding
Hyperkalemia	K ⁺ ≥ 6 mmol/L and/or electrocardiogram abnormalities
Hypermagnesemia	≥ 4 mmol/L and/or anuria/absent deep tendon reflexes
Acidosis	Serum pH ≤ 7.15
Oligo-anuria	Urine output < 200 mL/12 h or anuria
Fluid overload	Diuretic-resistant organ edema (that is, pulmonary edema) in the presence of acute kidney injury

Short-term mortality (≤ 31 days)



Long-term mortality (60-180 days)

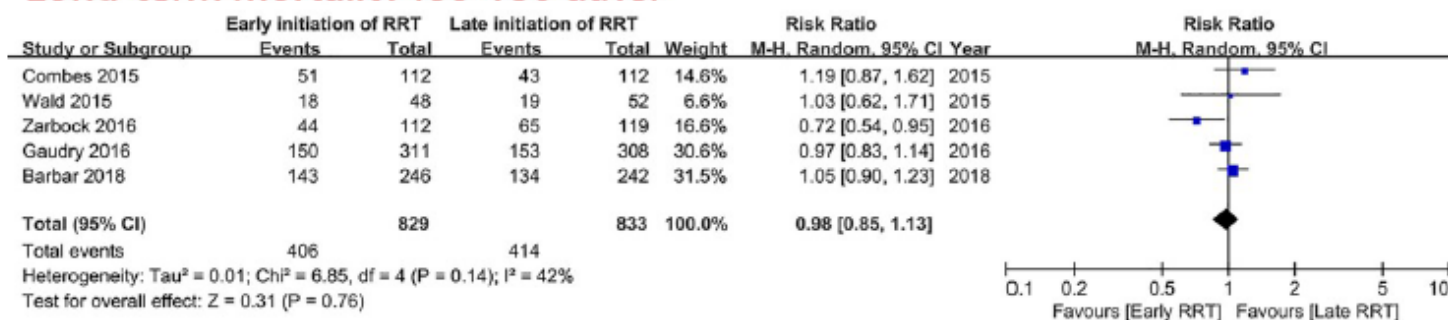


Fig 2. Association of early vs. delay of initiation of renal replacement therapy with short-term and long-term mortality.

<https://doi.org/10.1371/journal.pone.0223493.g002>

Emergentní kritéria (absolutní kritéria)

- Ve většině studií na timing zahájení vyloučení
- Zahájení „co nejdříve“ (30 min)
- Různé definice
- AKIKI studie

A	Acidosis pH <7.2
E	Persistent K >6 with Medical Mx
I	Intoxication
O	Fluid overload
U	Uraemia

- Severe laboratory abnormalities
 - Urea >40mmol/l, K >6mmol/l (or >5.5 despite medical treatment), pH <7.15 in context in context of either pure metabolic acidosis or mixed acidosis
- Acute pulmonary oedema due to fluid overload causing severe hypoxaemia
 - Requirement of >5 l/min oxygen to maintain SpO₂ >95%, or requiring FiO₂ >50% in ventilated patients despite diuresis

Pacienti bez emergentních kritérií

	KRT strategy	Key results
AKIKI Multicentre (n=620) KDIGO stage 3 AKI	Early KRT started immediately after randomisation	Primary outcome (survival at 60 days) similar between both groups Mortality 48.5% vs 49.7% RRT freedom 49% of patients in the delayed group did not require KRT. Complications CRBSI higher in Early group 10% vs 5% Renal recovery Diuresis occurred earlier in delayed arm
	Delayed KRT started if • A life-threatening complication of AKI developed • BUN > 112mg/dl • Oliguria persisted >72 h after randomisation	
ELAIN Single-centre (n=231) KDIGO stage 2	Early within 8 hours of diagnosis of KDIGO stage 2 AKI	Primary outcome (mortality at 90 days) lower in the early group 39.3% vs 54.7% RRT freedom 9.2% in the delayed group did not require KRT. Complications No difference
	Delayed within 12 hours of stage 3 AKI • life threatening complications of AKI • BUN >100mg/dl • Oliguria -UOP <200ml/12 hours or anuria	
IDEAL-ICU Multi-centre (n=488) RIFLE stage F	Early within 12 hours	Primary outcome (90 day mortality) similar in both arms 58% vs 54% RRT freedom 38% in delayed arm avoided KRT Complications Metabolic complications more common in delayed group: Hyperkalaemia 4% vs 0% Renal Recovery Dependence on KRT at 28 days similar 2 vs 3%
	Delayed 48 hours after randomisation in the absence of kidney recovery	
STARRT-AKI Multinational (n=2927) KDIGO stage 2 & 3	Accelerated within 12 hours of randomisation	Primary outcome (mortality at 90 days) similar in both arms 43.9% vs 43.7% RRT freedom 38.2% in standard arm avoided KRT Complications Higher in the accelerated arm 23.0% vs 16.5% Renal recovery Continued need for KRT at 90 days higher in the accelerated arm 10.4% vs 6.0%
	Standard • Life-threatening complications • Persistent AKI for ≥ 72 hours after randomization • When felt initiation was in patient's best interest	

- Časnější zahájení bez vlivu na outcome pokud:
 - Do 48-72h od splnění AKI stage III
 - Urea do 40 mmol/l
- Variabilní procento bez potřeby RRT
- Vyšší výskyt komplikací a dlouhodobé potřeby RRT u časných ramen



Comparison of two delayed strategies for renal replacement therapy initiation for severe acute kidney injury (AKIKI 2): a multicentre, open-label, randomised, controlled trial

Stéphane Gaudry, David Hajaqe, Laurent Martin-Lefevre, Saïd Lebbah, Guillaume Louis, Sébastien Moschietto, Dimitri Titeca-Beauport,

Delayed

- 72h oligurie (do 500 ml/d)
nebo U nad 40 mmol/l

More delayed

- Min 72 h oligurie
- +
- Hyperkalémie nebo
- MAC nebo
- Plicní edém nebo
- U nad 50 mmol/l

	Univariable analysis		Multivariable analysis	
	Hazard ratio (95% CI)	p value	Hazard ratio (95% CI)	p value
More-delayed strategy	1.34 (0.96–1.89)	0.13	1.65 (1.09–2.50)	0.018
Simplified Acute Physiology Score III	1.03 (1.02–1.05)	<0.0001	1.03 (1.01–1.05)	0.0005
Mechanical ventilation	2.90 (1.47–5.70)	<0.0001	3.44 (1.52–7.81)	0.0020
Catecholamine infusion	1.65 (1.17–2.44)	0.0080	1.15 (0.69–1.84)	0.64
Sepsis status	..	0.064	..	0.19
Sepsis	0.78 (0.47–1.30)	..	0.56 (0.28–1.12)	..
Septic shock	1.44 (0.98–2.12)	..	0.91 (0.51–1.64)	..
Time between ICU admission and acute kidney injury	0.69 (0.36–1.31)	0.24	0.70 (0.31–1.59)	0.39

ICU=intensive care unit.

Table 3: Multivariable analysis of risk factors for day-60 mortality

KDIGO 2026 klasifikace AKI

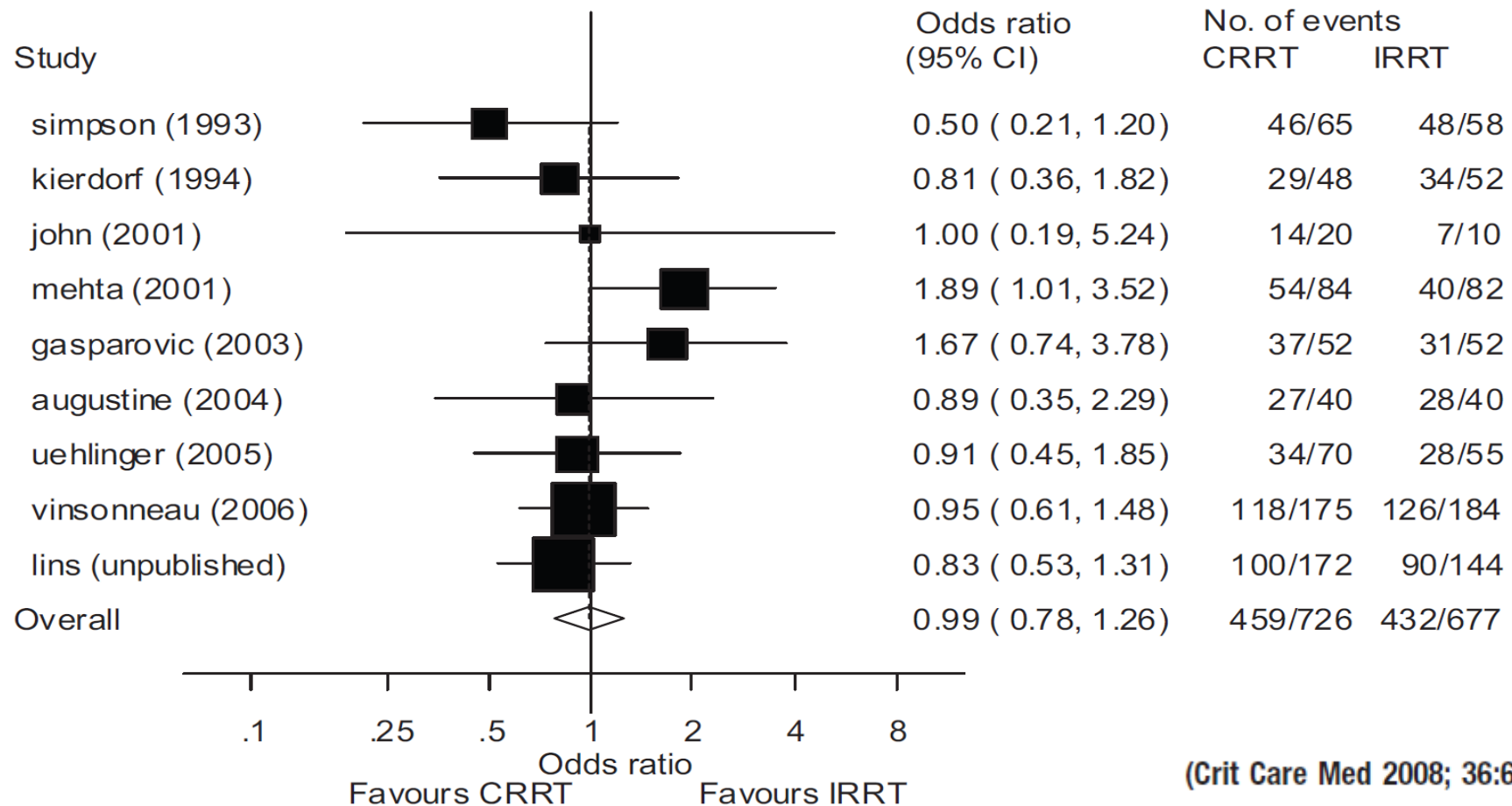
Functional criteria				Structural criteria	
Serum creatinine		Urine output		Damage biomarker	
Stage	Criteria	Stage	Criteria	Stage	Criteria
C0		U0		B1	Positive
C1	≥ 0.3 mg/dl (≥ 26.5 μ mol/l) increase, <i>Or</i> 1.5-1.9 times baseline	U1	<0.5 ml/kg/h for 6–12 hours	B0	Negative
				B1	Positive
C2	2–2.9 times baseline	U2	<0.5 ml/kg/h for >12 hours	B0	Negative
				B1	Positive
C3	≥ 3.0 times baseline, <i>Or</i> Increase in SCr to ≥ 4.0 mg/dl (≥ 353.6 μ mol/l) <i>Or</i> Initiation of RRT	U3	<0.3 ml/kg/h for >24 hours or anuria for >12 hours	B0	Negative
				B1	Positive

Jaká metoda?



Continuous versus intermittent renal replacement therapy for critically ill patients with acute kidney injury: A meta-analysis*

Sean M. Bagshaw, MD, MSc; Luc R. Berthiaume, MD; Anthony Delaney, MBBS, MSc; Rinaldo Bellomo, MD



(Crit Care Med 2008; 36:610–617)



Table 2 Primary and secondary outcomes in the included cohort

	CRRT (n = 2175)	IHD (n = 367)	Unadjusted analysis		Adjusted analysis ^a	
			Effect estimate (95% CI)	p value	Effect estimate (95% CI)	p value
<i>Primary outcome</i>						
RRT dependence at day 28—no. (%)	320 (14.7)	113 (30.8)	SHR, 0.75 (0.67 to 0.83)	<0.001	SHR, 0.96 (0.84 to 1.10)	0.570
Death before the event	618 (28.4)	95 (25.9)				
<i>Secondary outcomes</i>						
RRT dependence at day 60—no. (%)	145 (6.8)	49 (13.7)	SHR, 0.75 (0.62 to 0.90)	0.002	SHR, 1.04 (0.85 to 1.28)	0.670
Death before the event	673 (31.3)	109 (30.4)				
RRT-free days at day 28	0.0 (0.0–22.0)	0.0 (0.0–17.0)	COR, 1.38 (1.11 to 1.71)	0.004	COR, 1.45 (1.12 to 1.88)	0.005
Mean ± SD	9.1 ± 10.9	7.2 ± 10.2				
ICU length of stay, days	9.0 (4.0–19.0)	13.0 (7.0–25.0)	SHR, 0.82 (0.72 to 0.94)*	0.003	SHR, 1.03 (0.87 to 1.21)*	0.750
In survivors	11.0 (6.0–21.0)	13.0 (7.0–25.0)				
Hospital length of stay, days	19.0 (9.0–36.0)	25.0 (15.0–41.0)	SHR, 0.69 (0.60 to 0.81)*	<0.001	SHR, 0.81 (0.68 to 0.97)*	0.025
In survivors	28.0 (17.0–47.0)	30.0 (18.0–44.0)				
ICU mortality—no. (%)	848 (39.0)	108 (29.4)	OR, 1.53 (1.21 to 1.95)	<0.001	OR, 0.96 (0.71 to 1.29)	0.778
Hospital mortality—no. (%)	1016 (46.7)	121 (33.0)	OR, 1.78 (1.41 to 2.26)	<0.001	OR, 1.14 (0.86 to 1.52)	0.361
28-day mortality—no. (%)	875 (40.2)	114 (31.1)	HR, 1.38 (1.13 to 1.68)**	0.001	HR, 0.90 (0.72 to 1.12)**	0.343
60-day mortality—no. (%)	1005 (46.7)	143 (39.4)	HR, 1.28 (1.07 to 1.52)**	0.006	HR, 0.92 (0.75 to 1.13)**	0.434
<i>Sensitivity analysis</i>						
Among survivors at the longest follow-up—no. (%)						
RRT dependence at day 28	232 (20.9)	90 (40.9)	OR, 0.38 (0.28 to 0.52)	<0.001	OR, 0.54 (0.37 to 0.80)	0.002
RRT dependence at day 60	136 (12.3)	49 (22.6)	OR, 0.48 (0.33 to 0.70)	<0.001	OR, 0.76 (0.48 to 1.22)	0.261

The proportion of time spent on CRRT, evaluated in increments of 10%, was not associated with the composite outcome of death or RRT dependence at 90 days (OR 0.99; 95% CI 0.97–1.02) but was associated with a lower risk of RRT dependence at 90 days (0.94, 95% 0.9–0.98).

Initiation of continuous renal replacement therapy versus intermittent hemodialysis in critically ill patients with severe acute kidney injury: a secondary analysis of STARRT-AKI trial

Ron Wald^{1*}, Stephane Gaudry^{2,3}, Bruno R. da Costa⁴, Neill K. J. Adhikari⁵, Rinaldo Bellomo^{6,7,8,9}, Bin Du¹⁰, Martin P. Gallagher¹¹, Eric A. Hoste¹², François Lamontagne¹³, Michael Joannidis¹⁴, Kathleen D. Liu¹⁵, Daniel F. McAuley¹⁶, Shay P. McGuinness¹⁷, Alistair D. Nichol^{18,19}, Marlies Ostermann²⁰, Paul M. Palevsky^{21,22}, Haibo Qiu²³, Ville Pettilä²⁴, Antoine G. Schneider²⁵, Orla M. Smith²⁶, Suvi T. Vaara²⁷, Matthew Weir²⁸

Table 2 The association between initial RRT modality and primary and secondary outcomes

	Number of patients available for analysis				OR or MD Overlap weighting (95% CI)	p value
	CRRT	IHD	CRRT	IHD		
Primary outcome						
Death or RRT dependence at 90-days, n (%)	1590	606	823 (51.8)	329 (54.3)	0.81 (0.66 to 0.99)	0.044
Secondary outcomes						
All-cause mortality at 90 days, n (%)	1590	606	752 (47.3)	279 (46)	0.90 (0.74 to 1.11)	–
RRT dependence at 90 days (survivors only), (n (%))	838	327	71 (8.4)	50 (15.2)	0.61 (0.39 to 0.94)	–
ICU length of stay, days	1590	606	12 (5 to 36)	17 (7 to 165)	– 16.8 (– 34.3 to 0.7)	–
Hospital length of stay, days	1590	606	27 (10 to 81)	40 (15 to 166)	– 14.8 (– 32 to 2.5)	–
ICU-free days at 28 days, median (IQR)	1590	606	0 (0 to 17)	0 (0 to 17)	2 (1 to 3)	–
Hospital-free days at 90 days, median (IQR)	1590	606	0 (0 to 56)	0 (0 to 41)	6.6 (3.1 to 10)	–
Ventilator-free days at 28 days, median (IQR)	1590	606	15 (0 to 23)	17 (0 to 25)	0.4 (– 0.8 to 1.6)	–
Vasoactive-free days at Day 28, median (IQR)	1590	606	20 (0 to 25)	24 (0 to 27)	– 0.7 (– 1.9 to 0.5)	–

Kdy preferovat CRRT?

CRRT

- Hemodynamická nestabilita?
- Seps, MOF?
- IC patologie?
- Preexistující renální poškození?
- Reversibilita AKI
- Hyperhydratace/vysoký příjem tekutin

IHD

- Intoxikace
- ESKD
- Bez přetížení tekutin/zachovalá diuréza
- Možnost mobilizace

Rozhodovací algoritmus

- Je pacient hemodynamicky nestabilní? Ano CRRT
- Je přítomna IC patologie? Ano CRRT
- Je přítomno těžké přetížení tekutinami? Ano CRRT
- Je přítomna porucha acidobazické rovnováhy vyžadující kontinuální korekci? Ano CRRT
- Je přítomno MOF s vysokou hodnotou SOFA skóre? Ano CRRT



Kdy přejít z CRRT na IHD?



Initiation of continuous renal replacement therapy versus intermittent hemodialysis in critically ill patients with severe acute kidney injury: a secondary analysis of STARRT-AKI trial

Ron Wald^{1*}, Stephane Gaudry^{2,3}, Bruno R. da Costa⁴, Neill K. J. Adhikari⁵, Rinaldo Bellomo^{6,7,8,9}, Bin Du¹⁰, Martin P. Gallagher¹¹, Eric A. Hoste¹², François Lamontagne¹³, Michael Joannidis¹⁴, Kathleen D. Liu¹⁵, Daniel F. McAuley¹⁶, Shay P. McGuinness¹⁷, Alistair D. Nichol^{18,19}, Marlies Ostermann²⁰, Paul M. Palevsky^{21,22}, Haibo Qiu²³, Ville Pettilä²⁴, Antoine G. Schneider²⁵, Orla M. Smith²⁶, Suvi T. Vaara²⁷, Matthew Weir²⁸, Didier Dreyfuss^{3,29} and Sean M. Bagshaw³⁰ on behalf of the STARRT-AKI Investigators

The association between the proportion of time exposed to CRRT and principal outcomes

The proportion of time spent on CRRT, evaluated in increments of 10%, was not associated with the composite outcome of death or RRT dependence at 90 days (OR 0.99; 95% CI 0.97–1.02) but was associated with a lower risk of RRT dependence at 90 days (0.94, 95% 0.9–0.98).

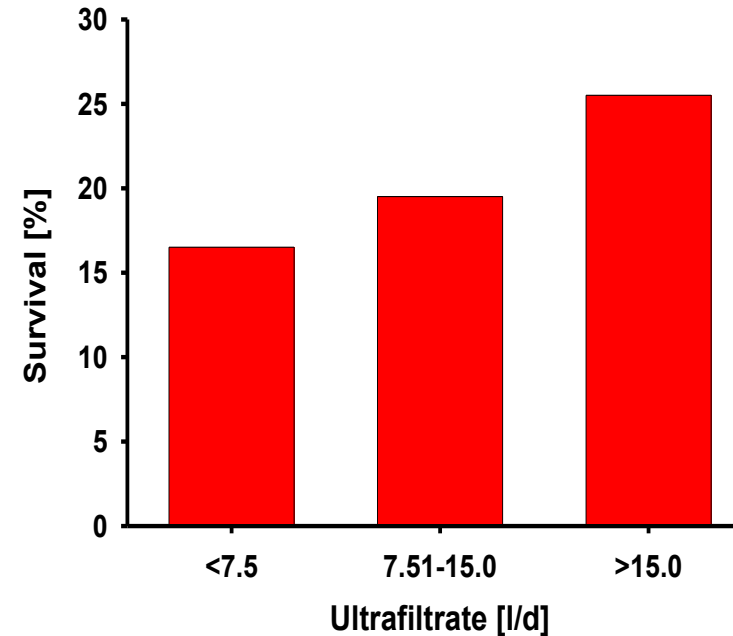
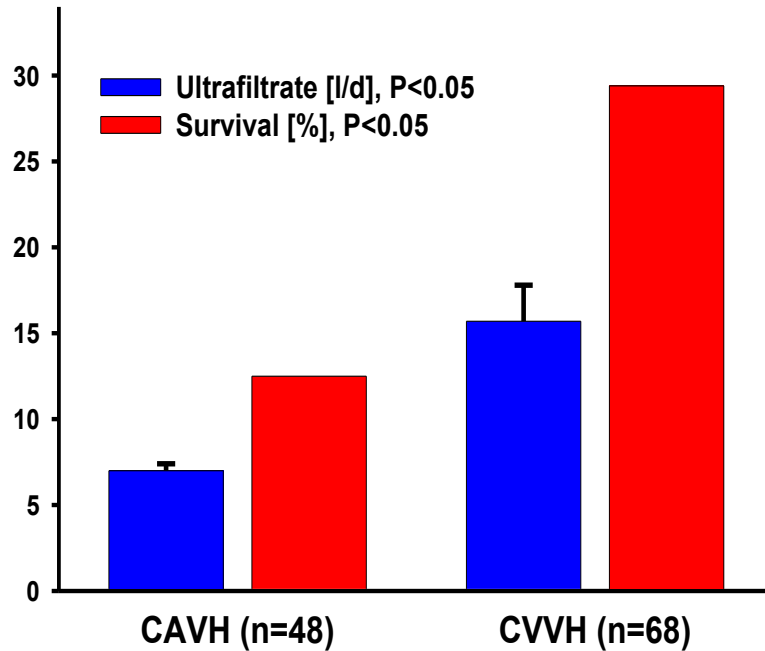
Pragmatický přístup

- RRT u pacienta s AKI bez intoxikace nebo ESKD zahájit v intenzivní péči pomocí CRRT (cca 72 h)
- 2. a ev. i další okruhy CRRT dle tabulky, kdy preferovat CRRT

Jaká dávka?



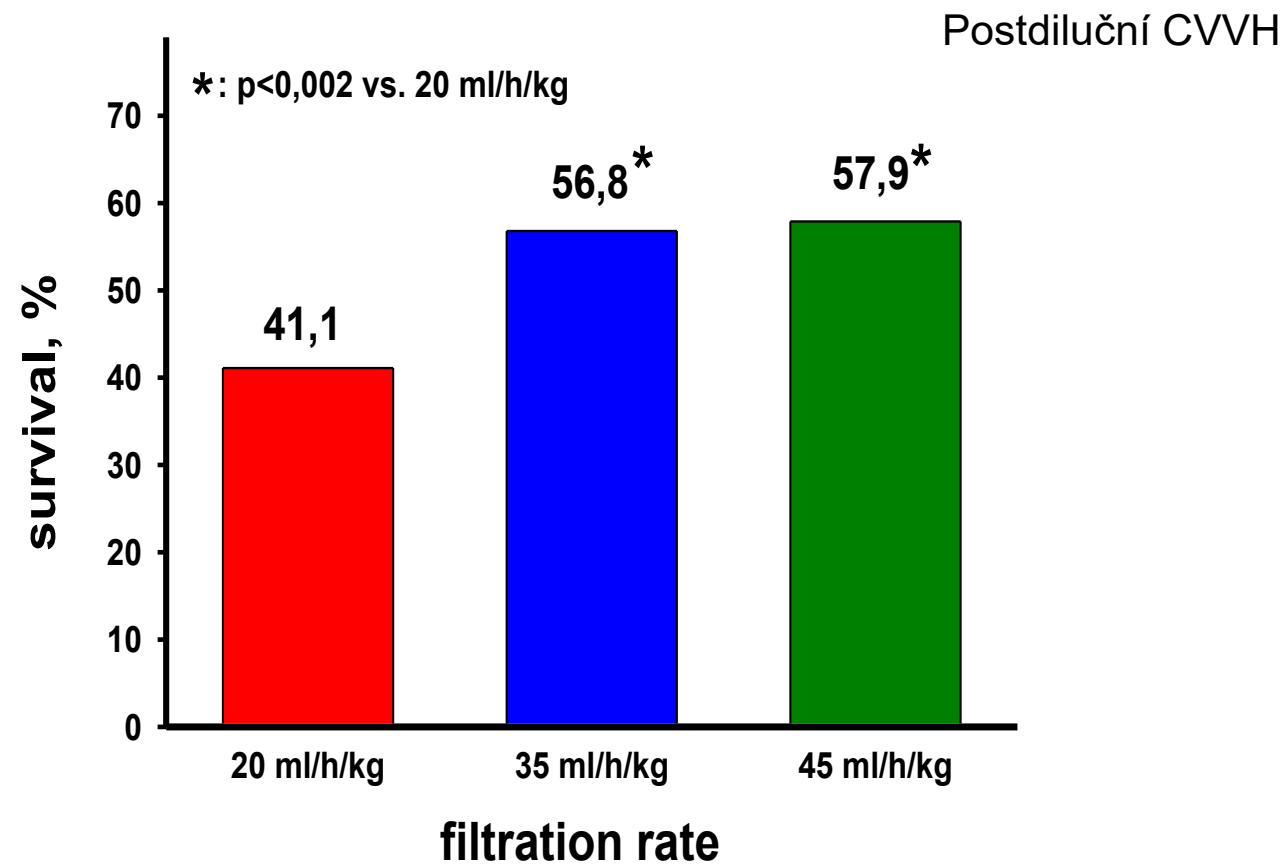
Jaká dávka - přežití a intenzita hemofiltrace



Storck M et al. The Lancet 337:452-455, 1991



Objem hemofiltrace a přežití



Ronco C et al, Lancet, 356:26-30 (2000)

The NEW ENGLAND JOURNAL *of* MEDICINE

ESTABLISHED IN 1812

JULY 3, 2008

VOL. 359 NO. 1

Intensity of Renal Support in Critically Ill Patients with Acute Kidney Injury

The VA/NIH Acute Renal Failure Trial Network*

CONCLUSIONS

Intensive renal support in critically ill patients with acute kidney injury did not decrease mortality, improve recovery of kidney function, or reduce the rate of nonrenal organ failure as compared with less-intensive therapy involving a defined dose of intermittent hemodialysis three times per week and continuous renal-replacement therapy at 20 ml per kilogram per hour. (ClinicalTrials.gov number, NCT00076219.)



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812

OCTOBER 22, 2009

VOL. 361 NO. 17

- Postdiluční CVVHDF 1:1
- BF 150 ml/h
- 40 ml/kg/h vs 25 ml/kg/h
- PAN AN 69
- Heparin nebo bez antikoagulace

Intensity of Continuous Renal-Replacement Therapy in Critically Ill Patients

Table 3. Primary and Secondary Outcomes.*

Outcome	Higher-Intensity CRRT	Lower-Intensity CRRT	Odds Ratio	P Value†
Death — no./total no. (%)				
By day 90	322/721 (44.7)	332/743 (44.7)	1.00 (0.81–1.23)	0.99
By day 28	278/722 (38.5)	274/743 (36.9)	1.07 (0.87–1.32)	0.52
Place of death — no./total no. (%)				
ICU	251/722 (34.8)	254/743 (34.2)	1.026 (0.827–1.273)	0.81
Hospital ward	68/722 (9.4)	76/743 (10.2)	0.913 (0.647–1.288)	0.60
Outside hospital, after discharge	3/722 (0.4)	2/743 (0.3)	1.546 (0.258–9.279)	0.63
RRT dependence among survivors				
At day 28	64/443 (14.4)	57/469 (12.2)	1.22 (0.83–1.79)	0.31
At day 90	27/399 (6.8)	18/411 (4.4)	1.59 (0.86–2.92)	0.14
No. of days of RRT, from randomization to day 90	13.0±20.8	11.5±18.0	—	0.14
No. of days in ICU	11.8±14.1	11.8±14.2	—	0.95
No. of days in hospital	26±25.8	25.7±24.7	—	0.79
No. of days of mechanical ventilation	7.3±5	7.4±5	—	0.79
No. of nonrenal organ failures — no./total no. (%)‡				
0	344/722 (47.6)	343/743 (46.2)	—	0.57
1	254/722 (35.2)	263/743 (35.4)	—	0.93
2	100/722 (13.9)	109/743 (14.7)	—	0.65
3	23/722 (3.2)	25/743 (3.4)	—	0.85
4	1/722 (0.1)	3/743 (0.4)	—	0.33



Poznámky k dávce

- Předepsaná dávka 25 ml/kg/h obvykle odpovídá dodané dávce cca 20 ml/kg/h
- Není zcela jasné, jak dávkovat u morbidně obézních
 - KDIGO 2026:
 - An initial CRRT dose-intensity for adults with high body mass index (BMI; e.g., ≥ 30 kg/m²) **based on ideal or adjusted body weight**, rather than actual body weight, can be used to avoid delivery of excess CRRT dose-intensity
- Nedialyzovat k normálním hodnotám U+ kreat (urea 14-21 mmol/l, kreat 150-300 μ mol/l?)

Lower versus standard dose-intensity continuous renal replacement therapy: a systematic review and meta-analysis

Nuttha Lumlertgul^{1*}, Prit Kusirisin^{2,3}, Janice Y. Kung⁴, D'Arcy Duquette², Tomoko Fujii⁵, Alexander Zarbock⁶, Ron Wald^{7,8,9} and Sean M. Bagshaw²

Table 2 Summary of results

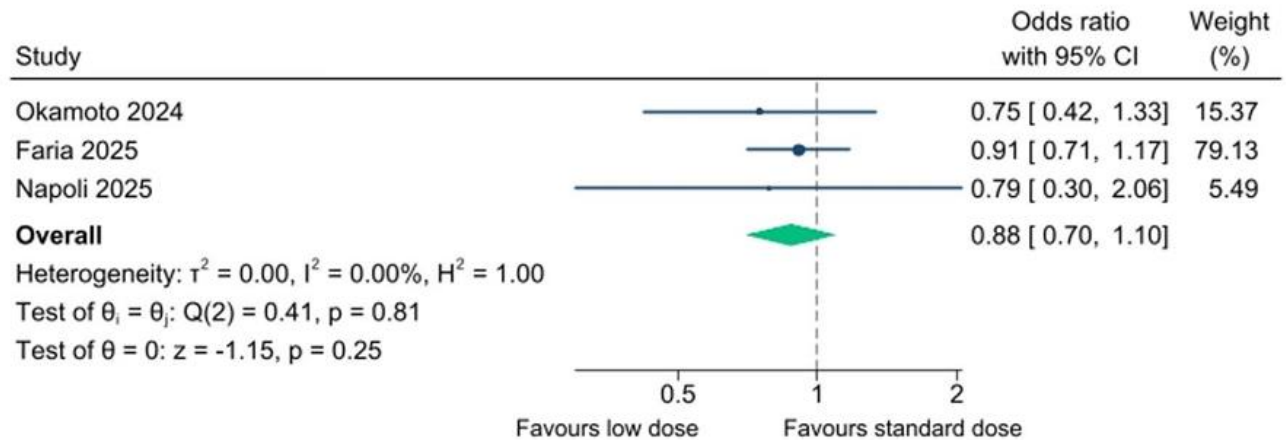
Outcomes	No. of studies	No. of participants	Level of evidence (GRADE)	Low	Standard	Relative effect (95% CI)	Estimated absolute effects***		I ²
							Risk with standard dose CRRT	Risk difference with low dose CRRT	
Mortality									
• 28-day mortality	3 (2 RCTs)	582	⊕○○○ Very low	149/281 (53.0%)	133/301 (44.2%)	OR 1.41 (95% CI 0.73–2.73)	44 per 100	8.6 more per 100 (7.6 fewer to 24.2 more)	71.7%
• 60-day mortality	1 (1 non-RCT)	125	-	-	-	HR 1.006 (95% CI 0.99–1.02)	-	-	-
• 90-day mortality	3 (3 non-RCTs)	1895	⊕○○○ Very low	312/702* (44.4%)	597/1193* (54.0%)	OR 0.88 (95% CI 0.70–1.10)	50 per 100	3.2 fewer per 100 (8.9 fewer to 2.4 more)	0.0%
• ICU mortality	6 (1 RCT)	2262	⊕○○○ Very low	351/780 (45.0%)	800/1482 (54.0%)	OR 0.77 (95% CI 0.60–0.98)	53 per 100	6.5 fewer per 100 (12.7 fewer to 0.5 fewer)	26.9%
• Hospital mortality	5 (1 RCT)	1999	⊕○○○ Very low	399/719 (55.5%)	810/1280 (63.3%)	OR 0.76 (95% CI 0.62–0.93)	63 per 100	6.6 fewer per 100 (11.7 fewer to 1.6 fewer)	0.0%
Recovery of kidney function									
• Dialysis dependence	6 (1 RCT)	814	⊕○○○ Very low	58/339*** (17.1%)	65/475*** (13.7%)	OR 1.08 (95% CI 0.73, 1.58)	16 per 100	1.1 more per 100 (3.8 fewer to 7.1 more)	0%



Nuttha Lumlertgul^{1*}, Prit Kusirisin^{2,3}, Janice Y. Kung⁴, D'Arcy Duquette², Tomoko Fujii⁵, Alexander Zarbock⁶, Ron Wald^{7,8,9} and Sean M. Bagshaw²

(B) 90-day mortality: subgroup analysis (<20 vs ≥20 mL/kg/hr)

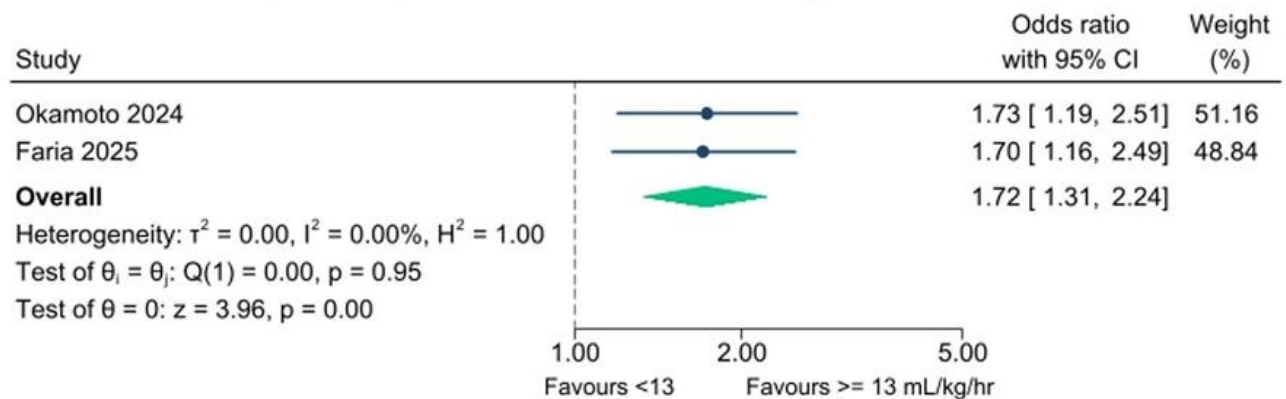
Pooled 90-day Mortality Effect: Standard vs. Low Dose/Intensity CRRT



Random-effects REML model

(C) 90-day mortality: subgroup analysis (<13 vs ≥13 mL/kg/hr)

Pooled 90-day Mortality Effect: <13 vs. ≥ 13 mL/kg/hr of CRRT Dose/Intensity



GUIDELINE

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Multidisciplinary guidelines on renal replacement therapy in intensive care medicine

Melanie Meersch-Dini^{1,24*}, Mariam Abu-Tair², Matthias Bayer³, Alexander Brinkmann⁴, Romuald Bellmann⁵, Frank Brunkhorst⁶, Florian Custodis⁷, David Czock⁸, Otto Frey⁹, Jan Galle¹⁰, Carsten Hermes¹¹, Michael Joannidis¹², Stefan John¹³, Achim Jörres¹⁴, Thomas Kerz¹⁵, Detlef Kindgen-Milles¹⁶, Martin Koczor¹⁷, Rainer Kram¹⁶, Martin Kuhlmann¹⁸, Michael Oppert^{19,20}, Georg Schlieper²¹, Michael Schmitz²², Alexander Zarbock¹ and Carsten Willam²³



Děkuji za pozornost.

