



# Insufficienza Renale Acuta

## Quando passare alla Dialisi ?



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Rimini 20 ottobre 2012

# Linee Guida sulla Dialisi. Il trattamento sostitutivo della Insufficienza Renale Acuta nel paziente critico

Coordinamento Generale Linee Guida SIN: G. Fuiano

Giornale Italiano di Nefrologia Anno 21, S-28 2004/pp. S1-S10

- Oliguria (volume urinario: <200 ml/12 ore)
- Anuria (volume urinario: 0-50 ml/12 ore)
- [Azotemia] >200 mg/dl
- Acidosi metabolica non compensata (pH <7,1)
- [K+] >6,5 mEq/l o in rapido aumento
- Severa progressiva disnatremia (>160 o <115 mEq/l)
- Edema d'organo (specialmente polmoni) clinicamente significativo
- Sospetto interessamento uremico di organo (pericardite, encefalopatia, miopatia/neuropatia)
- Ipertermia >39,5°C
- Coagulopatie con indicazione alla somministrazione intensiva di emoderivati in pazienti con o a rischio di edema polmonare o ARDS

- **Un criterio è sufficiente ad iniziare la RRT nel paziente critico**
- **Due criteri la rendono urgente ed obbligatoria**
- **Alterazioni combinate ne suggeriscono l'inizio anche se i limiti menzionati non sono stati superati**

# Use of the Artificial Kidney

CALIFORNIA MEDICINE

## Its Place in the Treatment of Acute Renal Failure

PETER F. SALISBURY, M.D., Ph.D., Burbank

TABLE 5.—Indications for the Use of the Artificial Kidney

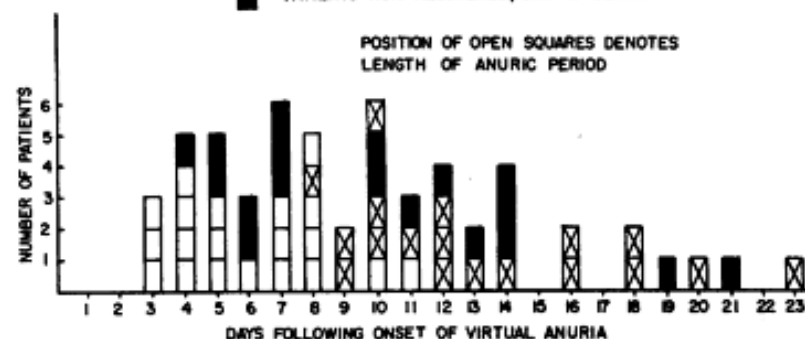
### I. Chemical indications:

- (a) Serum potassium 7.0 mEq. per liter or more.
- (b) Rapidly mounting serum potassium.
- (c) Carbon dioxide 12. mEq. per liter or less.
- (d) Blood urea nitrogen 150 mg. per 100 cc. or non-protein nitrogen 200 mg. per 100 cc.

II. Existence of two or more of the early clinical signs of uremia (reflex hyperactivity, restlessness, confusion, drowsiness, loud P<sub>2</sub>, low diastolic pressure, expiratory wheezes).

III. If, after dialysis, the above indications recur, dialysis should be repeated in compliance with the above indications, even though diuresis may already have set in.

□ PATIENTS RECOVERED, WITHOUT ARTIFICIAL KIDNEY  
 ⊠ PATIENTS TREATED WITH ARTIFICIAL KIDNEY, RECOVERED  
 ■ PATIENTS NON RECOVERED, DAY OF DEATH



In one case (not shown on chart) the patient was uremic but not anuric.

TABLE 3.—Patients with Anuria-Oliguria Eight Days or More

Survived without dialysis.....	6
Survived with dialysis (1 patient with acute uremia, without oliguria) .....	19
Died without dialysis*.....	11
Died with correctly employed dialysis.....	0

\*Dialysis was used as a measure of desperation or otherwise incorrectly in five of these cases.

# Acute Kidney Injury



Nessun consenso su definizione clinica e/o criteri diagnostici

- Circa 35 definizioni in letteratura
- Incidenza in U.T.I.: 1-25%
- Tasso di mortalità: 15-60%

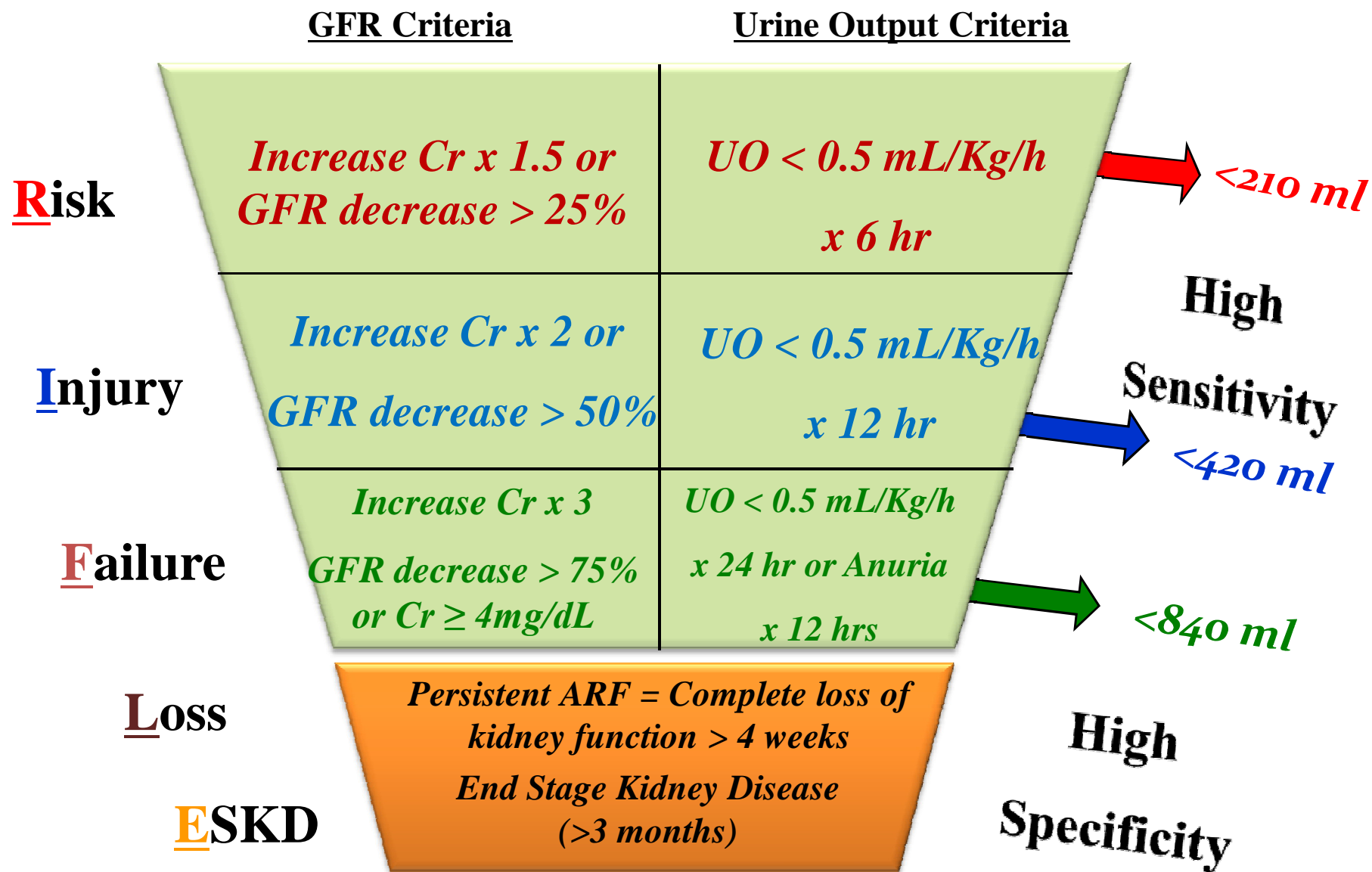
Il termine AKI proposto vuole riflettere l'intero spettro della disfunzione renale, riconoscendo che un acuto declino della funzione renale è spesso secondario ad un insulto che causa alterazioni funzionali ed organiche nel rene."

# RIFLE Criteria

Acute renal failure - definition, outcome measures, animal models, fluid therapy and information technology needs: the Second International Consensus Conference of the Acute Dialysis Quality Initiative (ADQI) Group

Rinaldo Bellomo<sup>1</sup>, Claudio Ronco<sup>2</sup>, John A Kellum<sup>3</sup>, Ravindra L Mehta<sup>4</sup>, Paul Palevsky<sup>5</sup> and the ADQI workgroup<sup>6</sup>

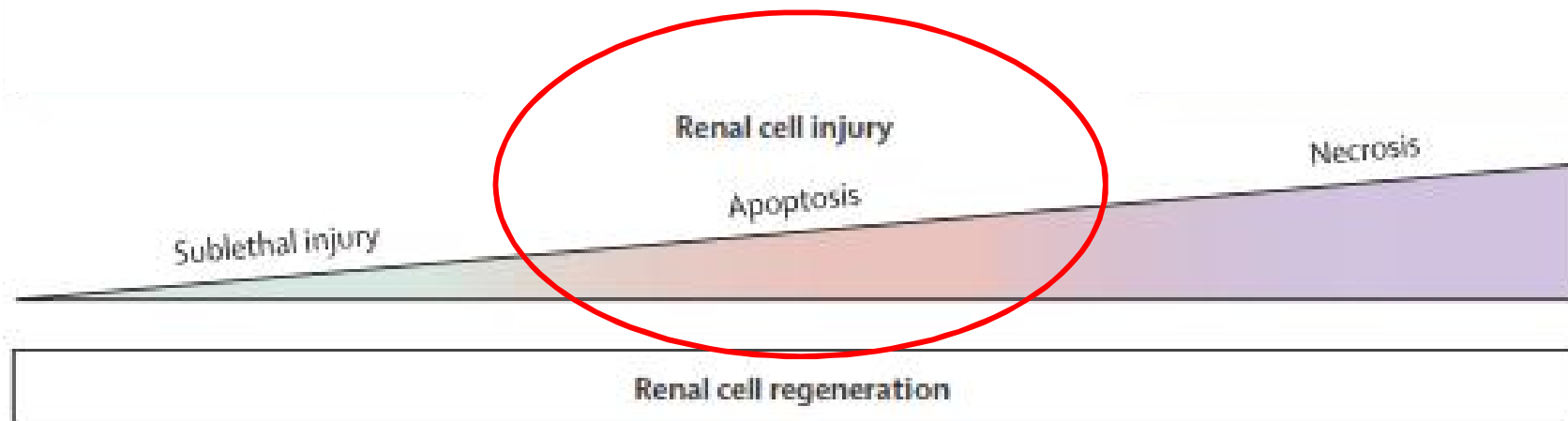
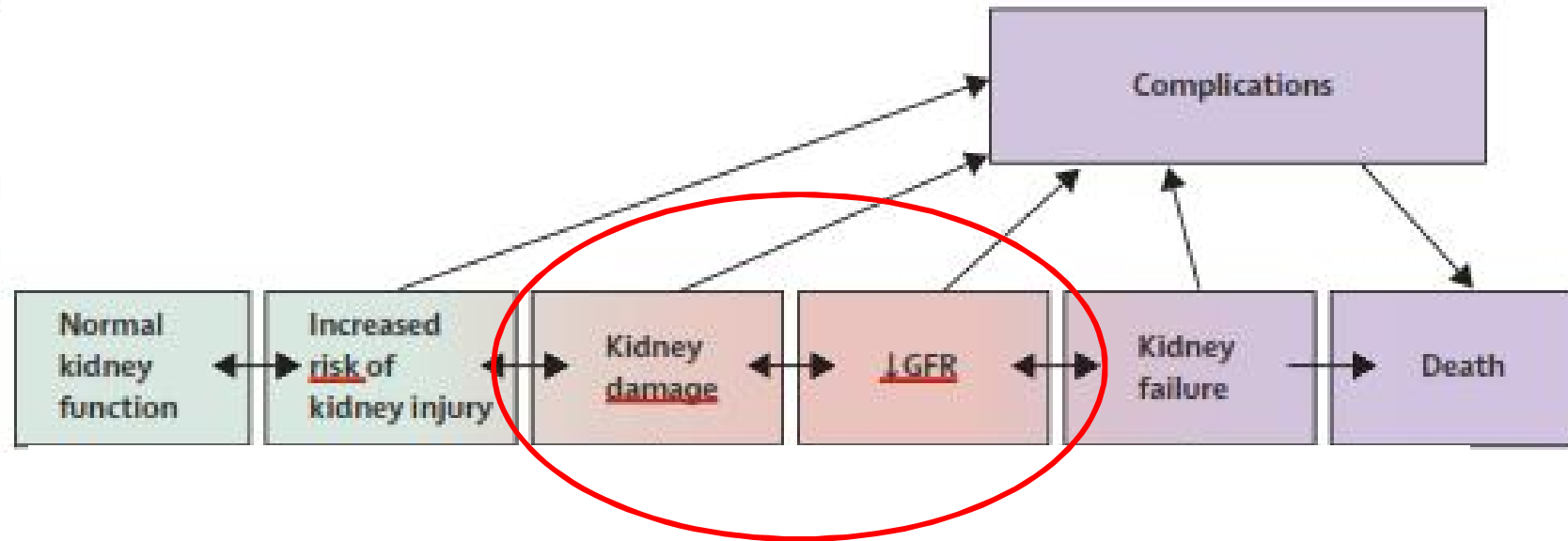
Critical Care 2004, 8:R204-R212



# Acute kidney injury

www.thelancet.com Published online May 21, 2012

Rinaldo Bellomo, John A Kellum, Claudio Ronco



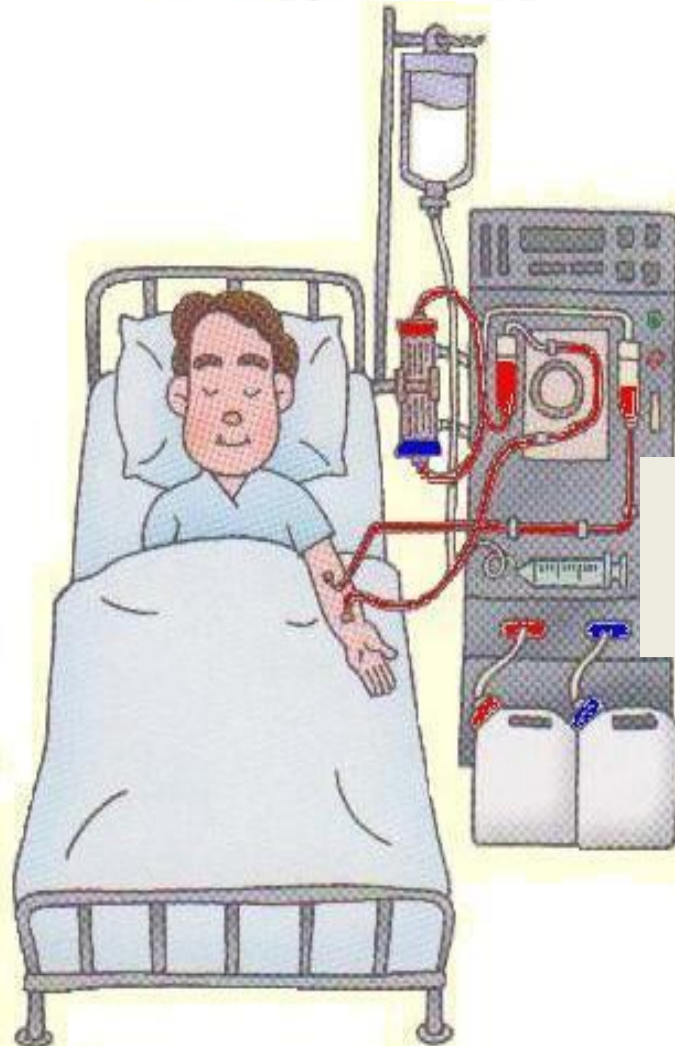


# 1,9% dei pazienti ospedalizzati

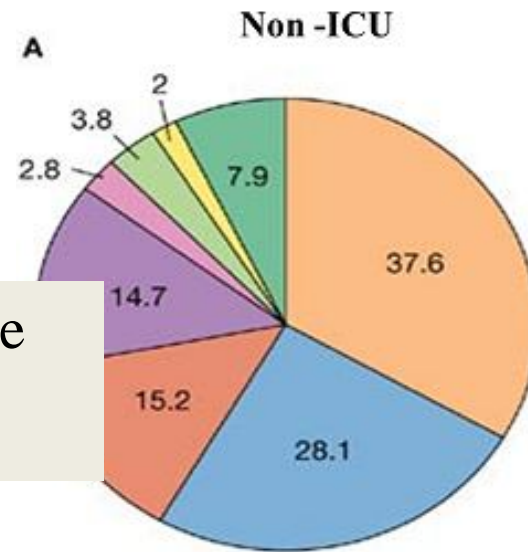
Liangos O, Wald R, O'Bell JW, Price L, Pereira BJ, Jaber BL. Epidemiology and outcomes of acute renal failure in hospitalized patients: a national survey. *Clin J Am Soc Nephrol* 2006; 1: 43-

## Tale valore raggiunge il 10% per stadio R.

Hsu CY, McCulloch CE, Fan D et al. Community-based incidence of acute renal failure. *Kidney Int* 2007;72:208–12



Quando passare alla Dialisi?



- ATN
- Prerenal
- Acute-on-chronic ARF
- Obstructive ARF
- ATIN
- AGN
- Acute atheroemboli
- Other causes

Lameire N et al. (2006) The changing epidemiology of acute renal failure  
*Nat Clin Pract Nephrol* 2: 364–377 doi:10.1038/ncpneph0218

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**TABLE 5.—Indications for the Use of the Artificial Kidney**

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  - III. If, after dialysis, the above indications recur, dialysis should be repeated in compliance with the above indications, even though diuresis may already have set in.
-



## ACUTE KIDNEY INJURY

Final Draft 8.01.11

**Table 3: Indications generally used to start renal replacement therapy in standard clinical practice in patients with AKI**

Biochemical indications	
	<u>Refractory hyperkalaemia</u> > 6.5 mmol/l
	<u>Refractory metabolic acidosis</u> pH < 7.15
	<u>Refractory electrolyte abnormalities:</u> Hyponatraemia, hypernatraemia or hypercalcaemia
	Tumour lysis syndrome with hyperuricaemia and hyperphosphataemia
	Urea cycle defects, and organic acidurias resulting in hyperammonaemia, methylmalonic acidaemia
Clinical indications	
	<u>Urine output &lt; 0.3 ml/kg for 24 h or absolute anuria for 12 h</u>
	<u>Refractory volume overload</u>
	End organ involvement: pericarditis, encephalopathy, <u>neuropathy, myopathy</u> , uraemic bleeding
	Creation of intravascular space for plasma and other blood product infusions and nutrition
	Severe poisoning or drug overdose
	Severe hypothermia or hyperthermia



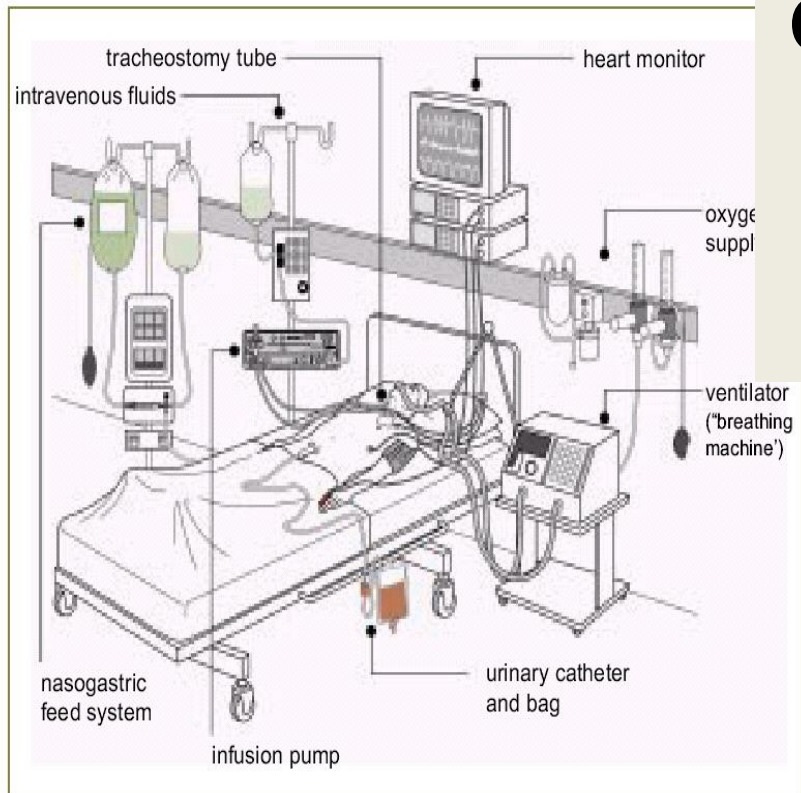
**INCIDENZA 36%**

Bagshaw SM, George C, Bellomo R, and the ANZICS Database Management Committee. Early acute kidney injury and sepsis: a multicentre evaluation. *Crit Care* 2008; 12: R47.

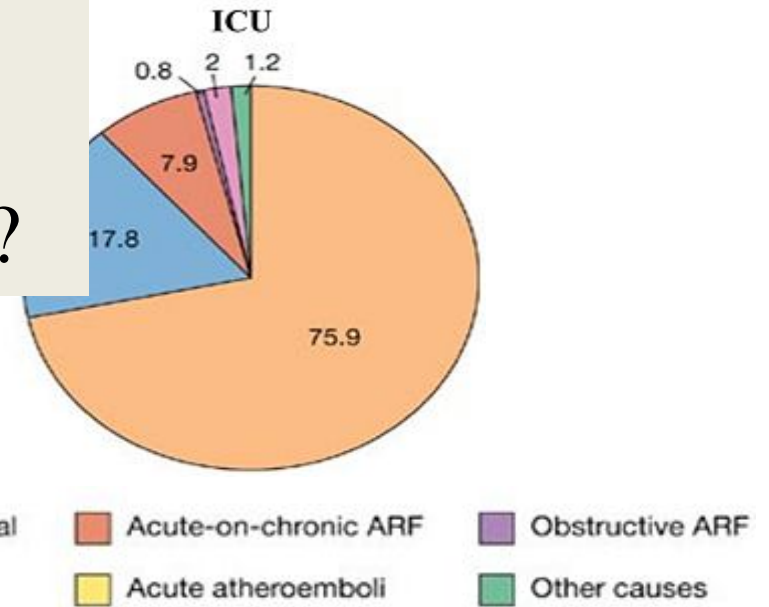
**PREVALENZA 60%**

Hoste EA, Clermont G, Kersten A, et al. RIFLE criteria for acute kidney injury are associated with hospital mortality in critically ill patients: a cohort analysis. *Crit Care* 2006; 10: R73.

**MORTALITA' 50%**



Quanto presto  
passare  
alla Dialisi?



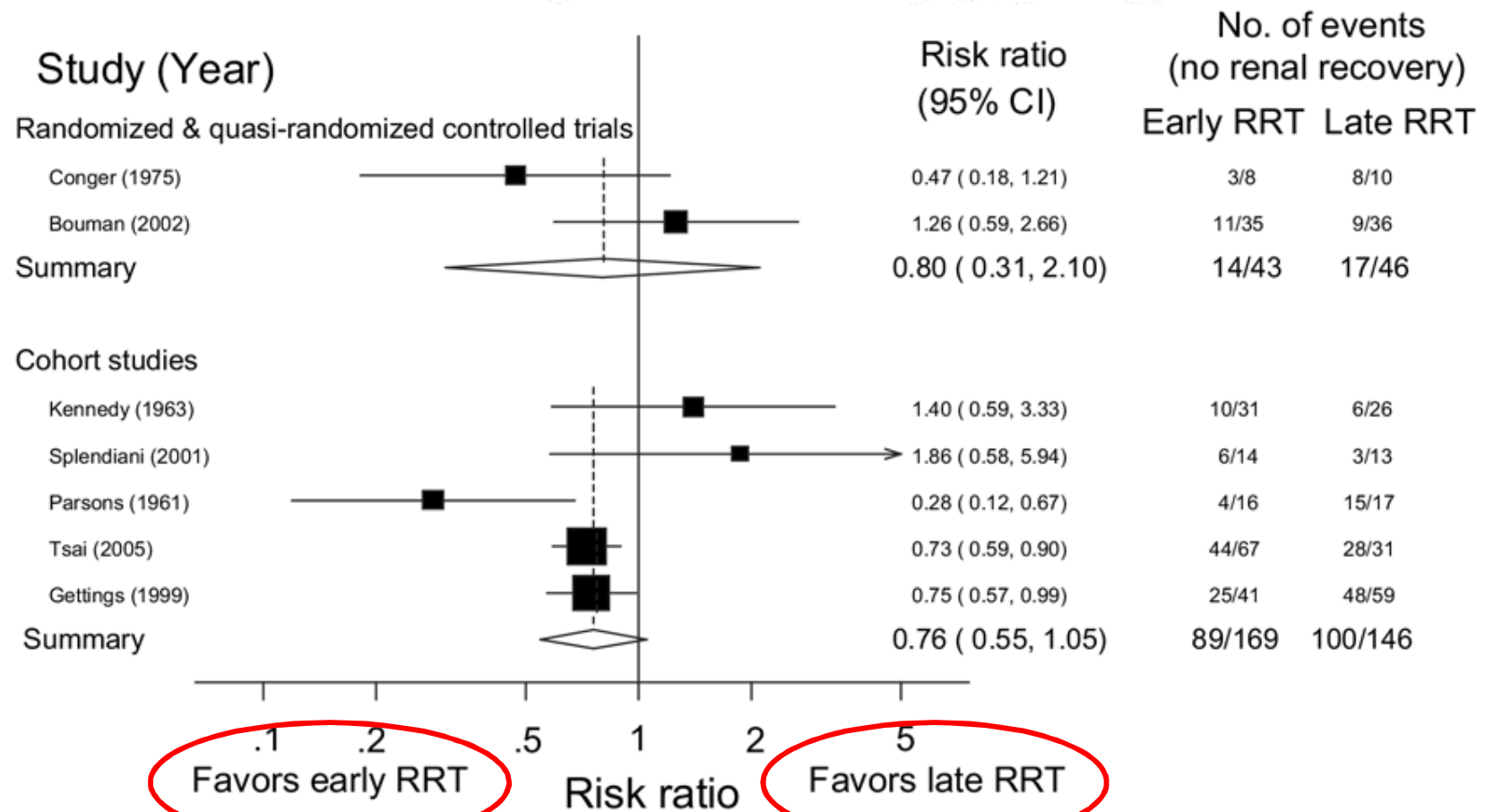
Lameire N *et al.* (2006) The changing epidemiology of acute renal failure

*Nat Clin Pract Nephrol* 2: 364–377 doi:10.1038/ncpneph0218

# Timing of Renal Replacement Therapy Initiation in Acute Renal Failure: A Meta-analysis

Victor F. Seabra, MD,<sup>1</sup> Ethan M. Balk, MD, MPH,<sup>2</sup> Orfeas Liangos, MD,<sup>3</sup> Marie Anne Sosa, MD,<sup>3</sup>  
 Miguel Cendoroglo, MD,<sup>4</sup> and Bertrand L. Jaber, MD, MS<sup>3</sup>

*American Journal of Kidney Diseases*, Vol 52, No 2 (August), 2008: pp 272-284



# Moving Points in Nephrology

## Timing of Initiation and Discontinuation of Renal Replacement Therapy in AKI: Unanswered Key Questions

Noel Gibney,<sup>\*</sup> Eric Hoste,<sup>†</sup> Emmanuel A. Burdmann,<sup>‡</sup> Timothy Bunchman,<sup>§</sup> Vijay Kher,<sup>||</sup> Ravindran Viswanathan,<sup>¶</sup> Ravindra L. Mehta,<sup>\*\*</sup> and Claudio Ronco<sup>††</sup>

Table 1. The indications for renal replacement therapy in patients with AKI

Indication	Characteristics	Absolute/Relative
Metabolic abnormality	BUN > 76 mg/dl (27 mmol/L)	Relative
	BUN > 100 mg/dl (35.7 mmol/L)	Absolute
	Hyperkalemia > 6 mEq/L	Relative
	Hyperkalemia > 6 mEq/L with ECG abnormalities	Absolute
	Dysnatremia	Relative
	Hypermagnesemia > 8 mEq/L (4 mmol/L)	Relative
	Hypermagnesemia > 8 mEq/L (4 mmol/L)	Absolute
Acidosis	with anuria and absent deep tendon reflexes	
	pH > 7.15	Relative
	pH < 7.15	Absolute
Anuria/oliguria	Lactic acidosis related to metformin use	Absolute
	RIFLE class R	Relative
	RIFLE class I	Relative
Fluid overload	RIFLE class F	Relative
	Diuretic sensitive	Relative
	Diuretic resistant	Absolute



## Original Articles

# Effect of timing of dialysis on mortality in critically ill, septic patients with acute renal failure

Daniel E. CARL,<sup>1</sup> Catherine GROSSMAN,<sup>2</sup> Martha BEHNKE,<sup>3</sup> Curtis N. SESSLER,<sup>4</sup> Todd W. B. GEHR<sup>5</sup>

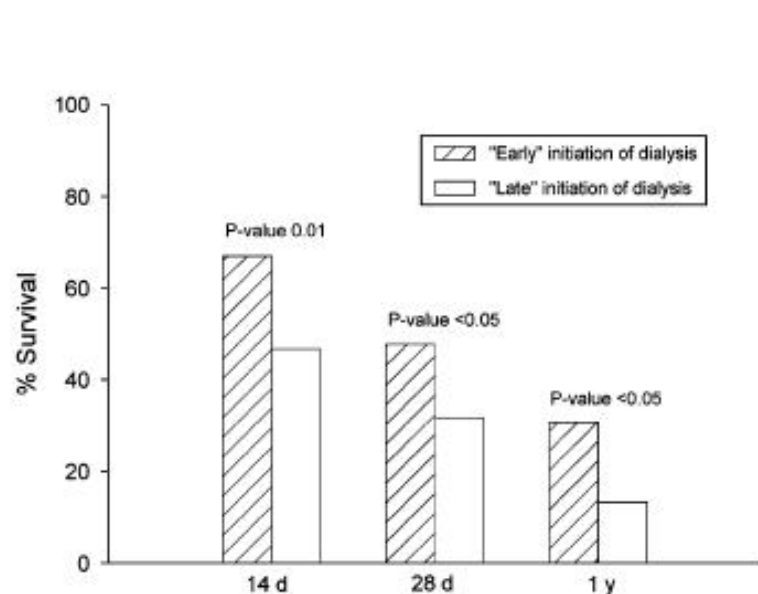


Figure 1 % Survival for patients dialyzed "early" vs. "late."

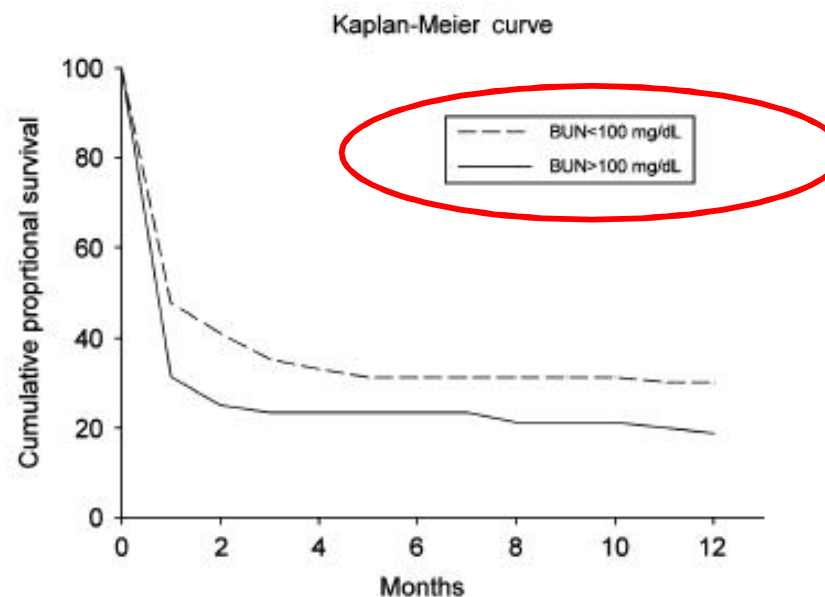


Figure 2 Kaplan-Meier estimate of survival in study groups.



# The “BUNcentric” approach to RRT timing

Palevski PM

*Critical Care* 2007, 11:232 (doi:10.1186/cc6121)

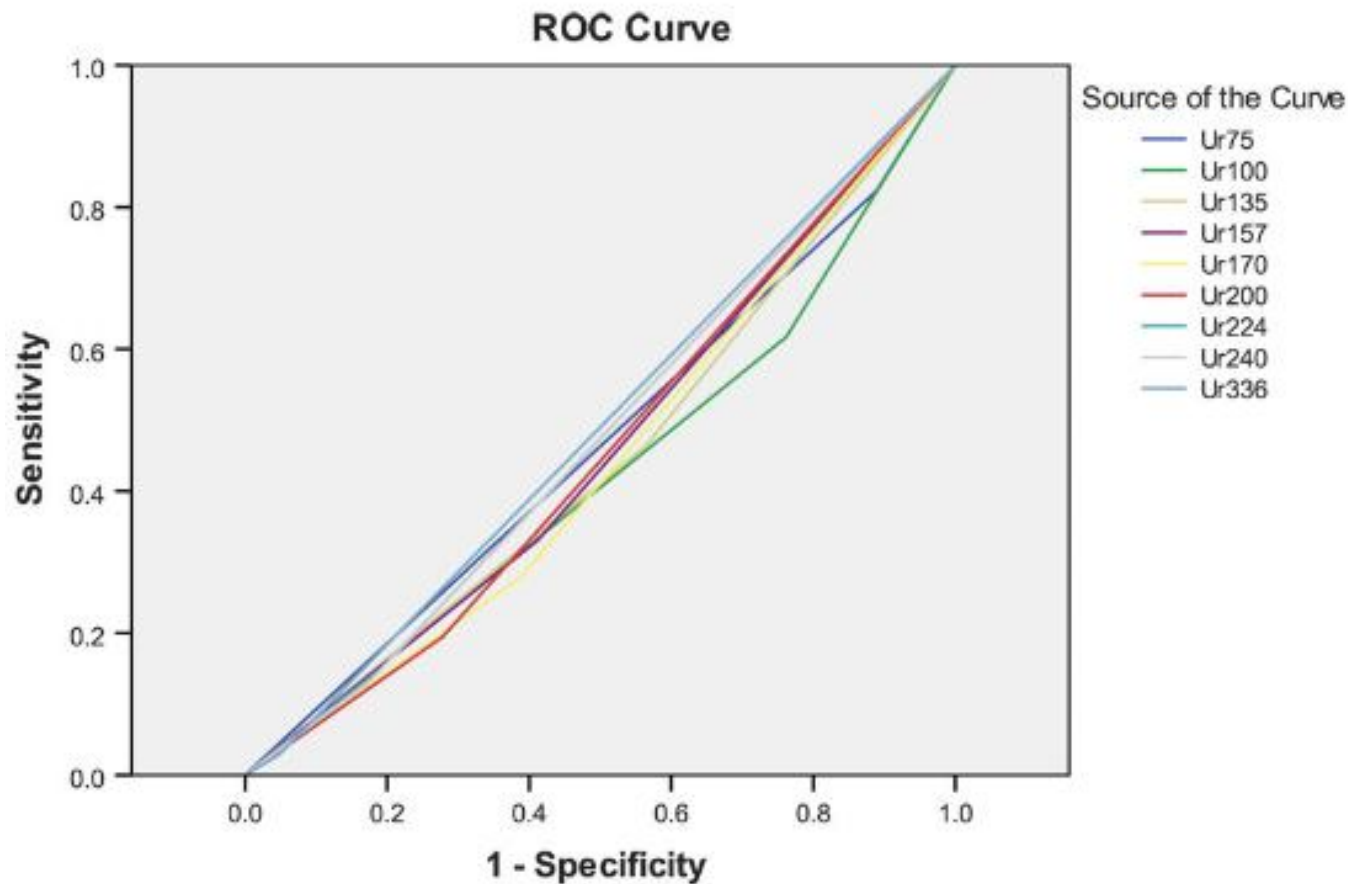
## Summary of studies evaluating the timing of initiation of renal replacement therapy

Study	Year	Mode of RRT	Study design	N	BUN at initiation of RRT (mg/dl)		Survival (%)	
					Early	Late	Early	Late
Parsons <i>et al.</i> [25]	1961	IHD	Retrospective	33	120-150	>200	75	12
Fisher <i>et al.</i> [26]	1966	IHD	Retrospective	162	~150	>200	43	26
Kleinknecht <i>et al.</i> [27]	1972	IHD	Retrospective	500	<93	>163	73	58
Conger [28]	1975	IHD	RCT	18	<70	~150	64	20
Gillum <i>et al.</i> [29]	1986	IHD	RCT	34	<60	~100	41	53
Gettings <i>et al.</i> [31]	1999	CRRT	Retrospective	100	<60	>60	39	20
Bouman <i>et al.</i> [12]	2002	CRRT	RCT	106	LV: 48 (40-66) <sup>a</sup> HV: 46 (38-58) <sup>a</sup>	LV: 105 (62-116) <sup>a</sup>	LV: 69 HV: 74	LV: 75
Demirkiliç <i>et al.</i> [32]	2004	CRRT	Retrospective <sup>b</sup>	61	NS	NS	77	45
Elahi <i>et al.</i> [33]	2004	CRRT	Retrospective <sup>b</sup>	64	67 ± 35 <sup>c</sup>	75 ± 61 <sup>c</sup>	78	57
Piccinni <i>et al.</i> [34]	2006	CRRT	Retrospective <sup>d</sup>	80	NS	NS	55	28
Liu <i>et al.</i> [35]	2006	IHD and CRRT	Observational	243	≤ 76	>76	65	59

<sup>a</sup>Median blood urea nitrogen (BUN; quartiles). <sup>b</sup>RRT started based on urine output <100 ml over 8 hours in early group and based on biochemical parameters in late group. <sup>c</sup>Mean BUN ± standard deviation. <sup>d</sup>Patients with sepsis and oliguria; RRT started within 12 hours of ICU admission in early group and based on 'conventional indications'. CRRT, continuous renal replacement therapy; HV, high-volume hemofiltration; IHD, intermittent hemodialysis; LV, low-volume hemofiltration; NS, not specified; RCT, randomized controlled trial; RRT, renal replacement therapy.

## Serum urea concentration is probably **not related** to outcome in ICU patients with AKI and renal replacement therapy

Wouter De Corte<sup>1,2</sup>, Raymond Vanholder<sup>3</sup>, Annemieke W. Dhondt<sup>3</sup>, Jan J. De Waele<sup>1</sup>, Johan Decruyenaere<sup>1</sup>, Christian Danneels<sup>1</sup>, Stefaan Claus<sup>3</sup> and Eric A.J. Hoste<sup>1</sup>

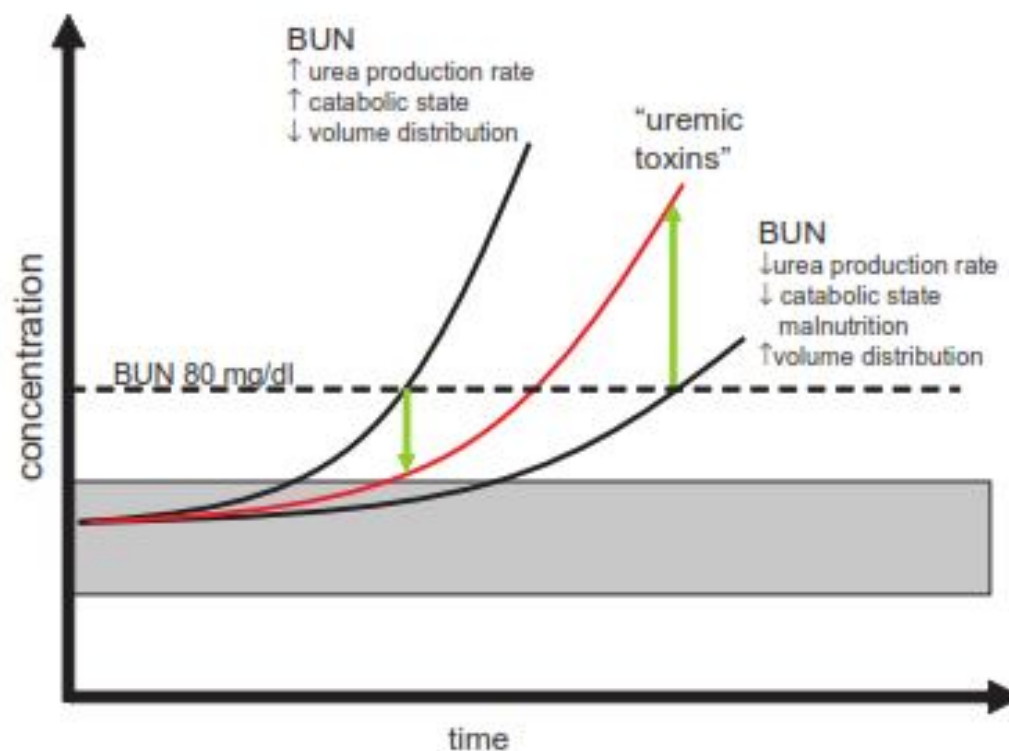




REVIEW

# Clinical review: Timing of renal replacement therapy

Michael Joannidis\*<sup>1</sup> and Lui G Forni<sup>2</sup>



**Figure 1. Relation of blood urea nitrogen to uremic toxins.**

Blood urea nitrogen (BUN) is influenced by several factors, including catabolism, volume of distribution, production rate, and antidiuretic hormone release independent of concentration of uremic toxins.

Author:	Year	Study design	Population	Modality	Early (n)	Late (n)	Early criteria	Late criteria
<b>Bouman</b> [10]	2002	Randomised	Cardiac surgery/medical	CWH	35	36	RRT within 12 hours if Urine Output <30 ml/hr	Urea >40 mmol/l or K >6.5 mmol/L
<b>Sugahara</b> [32]	2004	Randomised	Cardiac Surgery	CWH	14	14	Urine Output <20 ml/hr	Urine Output <30 cc/hr
<b>Liu</b> [21]	2006	Prospective Cohort	Medical,Surgery	CRRT/IHD	122	121	Urea <27.1 mmol/L	Urea >27.1 mmol/L
<b>Sabater</b> [33]	2008	Prospective Cohort	Medical (Septic Shock)	CWHF	9	23	Rifle Criteria (Risk, Injury)*	Rifle Criteria (Failure)**
<b>Bagshaw</b> [34]	2009	Prospective Cohort	Medical, Surgical	CRRT/IHD	618	619	Urea <24.2 mmol/L	Urea >24.2 mmol/L
<b>Bagshaw</b> [35]	2010	Prospective Cohort	Medical, Surgical	CRRT/IHD	117	117	Urea <23 mmol/L	Urea >23 mmol/L
<b>Gettings</b> [15]	1999	Retrospective Cohort	Trauma	CAVHD and CWHF	41	59	Urea <21.4 mmol/L	Urea >21.4 mmol/L
<b>Elahi</b> [38]	2004	Retrospective Cohort	Cardiac surgery	CWH	28	36	Urine Output <100 cc in 8 hrs	K >6 mmol/L, Cr >250 mmol/L
<b>Dermirkilic</b> [13]	2004	Retrospective Cohort	Cardiac Surgery	CWHDF	27	34	Cr >400 µmol/L, Potassium >5.5 mmol/L	Oliguria
<b>Andrade</b> [36]	2007	Retrospective Cohort	Medical (ARDS/ Sepsis)	IHD/SLED	18	15	On admission	At 24 hours
<b>Wu</b> [42]	2007	Retrospective Cohort	Surgical ALF	IHD/CWH	54	26	Urea < 28.6 mmol/L	Urea >28.6 mmol/L
<b>Manche</b> [40]	2008	Retrospective Cohort	Cardiac Surgery	IHD	56	15	Hyperkalemia	U/O <0.5 ml/kg/hour
<b>Iyem</b> [39]	2009	Retrospective Cohort	Cardia Surgery	CWH	95	90	RRT on admission	After 48 hours when anuric
<b>Shiao</b> [41]	2009	Retrospective Cohort	Surgery/Trauma	CWH	51	47	Rifle Criteria (Risk)*	Rifle Injury, Failure**
<b>Carl</b> [37]	2010	Retrospective Cohort	Medical (sepsis)	CRRT/IHD	85	62	Urea <35.7 mmol/l	Urea >35.7 mmol/L

**Pazienti  
con AKI**

**Fattori  
correlati  
alla  
dialisi  
(RRT)**

**Fattori  
correlati  
al  
paziente**



**Summary of selected factors potentially influencing the decision to initiate renal replacement therapy in critically ill patients**

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	Factors
Patient-specific	Kidney function/reserve Co-morbid disease and physiologic reserve Primary diagnosis: severity of illness and trajectory Acute kidney injury: severity and trend
Clinician-specific	Goals of therapy Relative indications and clinician threshold for initiation Local practice patterns Prescribing service
Organizational	Country/institution ICU type Machine and nursing availability Health costs

# A comparison of early versus late initiation of renal replacement therapy in critically ill patients with acute kidney injury: a systematic review and meta-analysis

Constantine J Karvellas<sup>1</sup>, Maha R Farhat<sup>2</sup>, Imran Sajjad<sup>3</sup>, Simon S Mogensen<sup>4</sup>, Alexander A Leung<sup>5</sup>, Ron Wald<sup>6</sup>, Sean M Bagshaw<sup>1\*</sup>



Figure 1 Outline of study selection process.

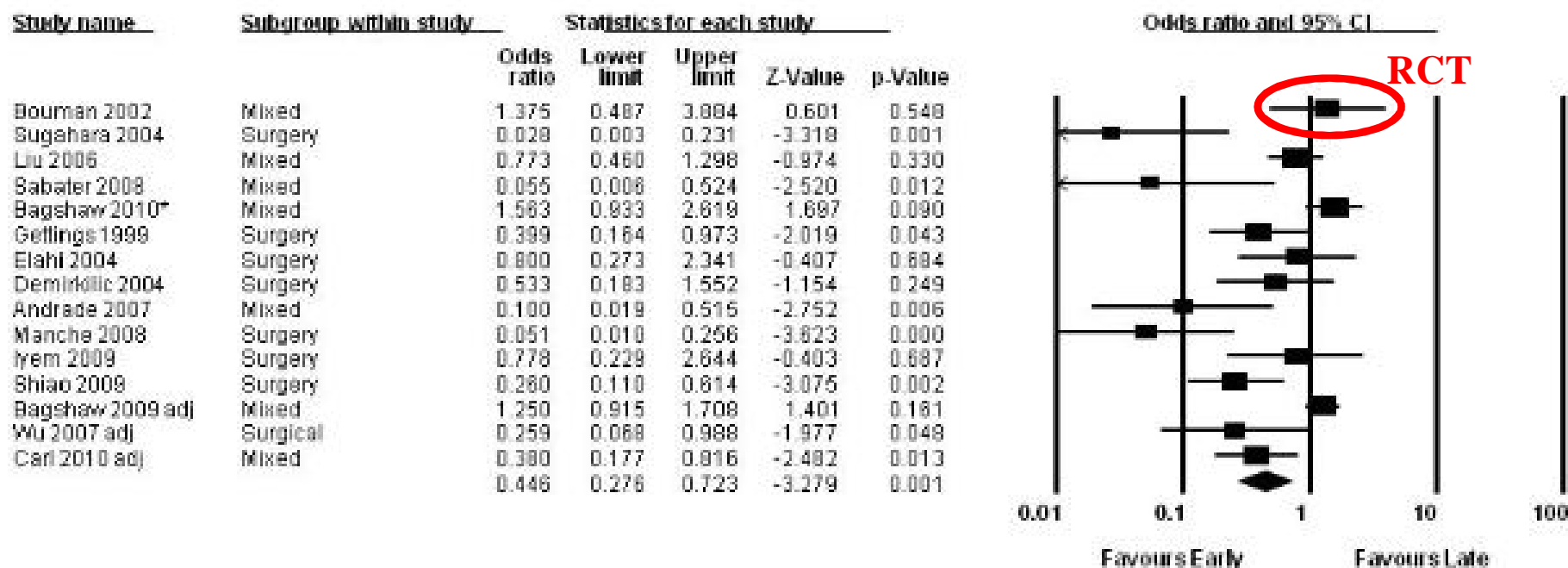
RESEARCH

Open Access

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Constantine J Karvellas<sup>1</sup>, Maha R Farhat<sup>2</sup>, Imran Sajjad<sup>3</sup>, Simon S Mogensen<sup>4</sup>, Alexander A Leung<sup>5</sup>, Ron Wald<sup>6</sup>, Sean M Bagshaw<sup>1\*</sup>

## Meta Analysis: All 15 studies



Meta Analysis

Figure 2 Forest plot of all 15 studies (Random Effects Model, OR, 95% CI).



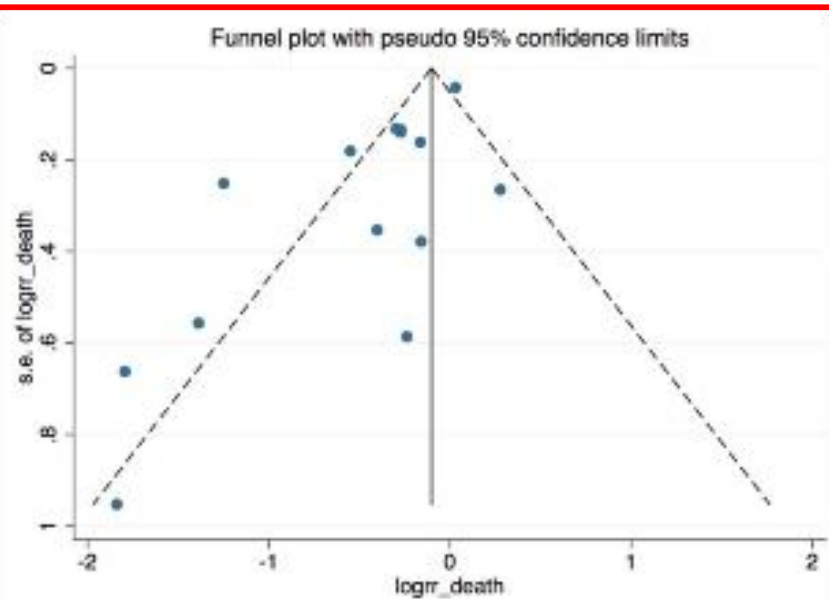
RESEARCH

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**Conclusions:** Earlier institution of RRT in critically ill patients with AKI may have a beneficial impact on survival. However, this conclusion is based on heterogeneous studies of variable quality and only two randomised trials. In the absence of new evidence from suitably-designed randomised trials, a definitive treatment recommendation cannot be made.



**Figure 5** Funnel plot of all 15 studies. X-axis is log of risk ratio of death, Y-axis is Standard error of Log Risk ratio of death. Egger's regression (plot not shown): Bias (intercept) -3.19736, P-value = 0.00025 (null hypothesis stating no small study effects is REJECTED).

Quando passare  
alla Dialisi?

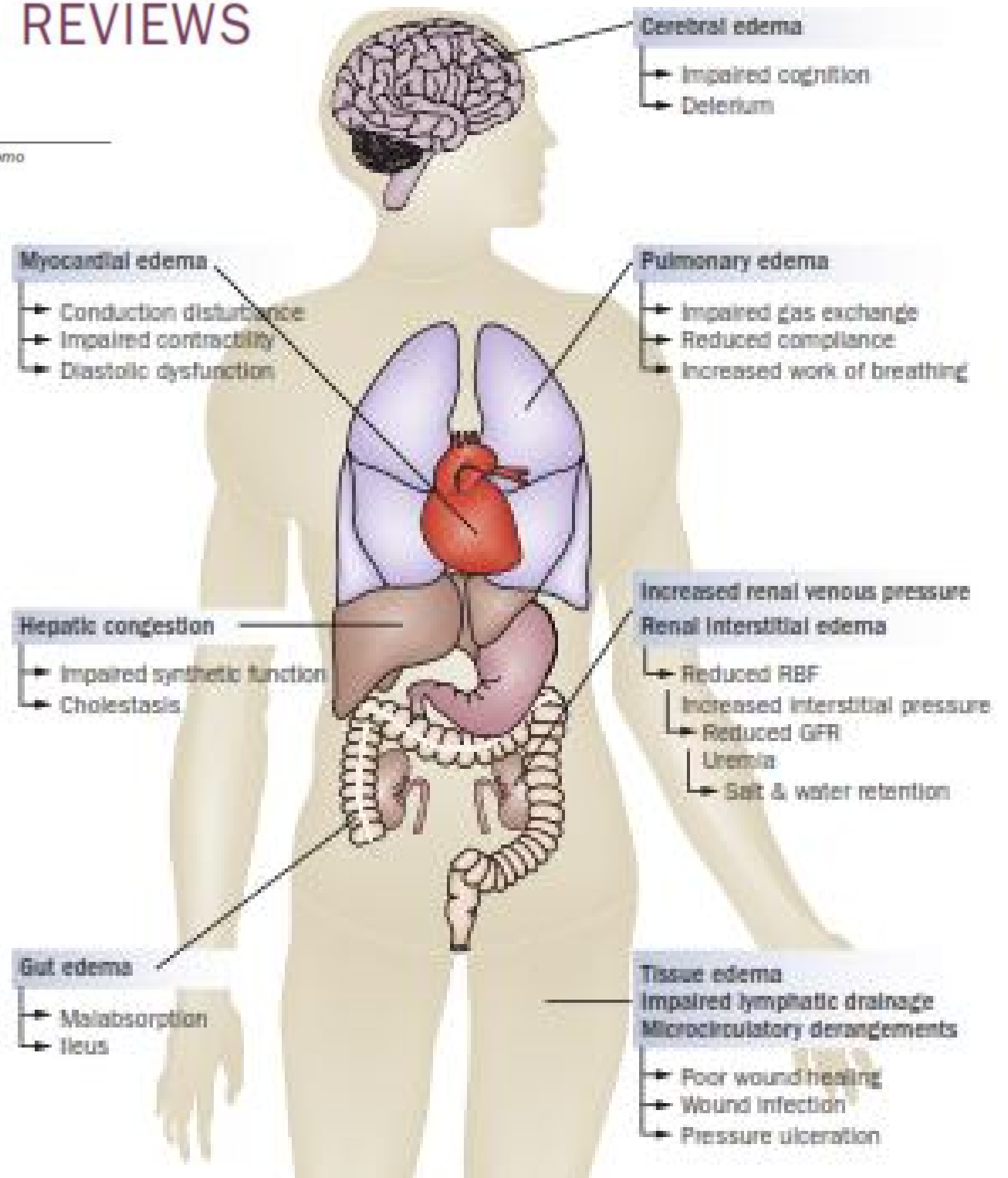


# REVIEWS

Nat. Rev. Nephrol. 6, 107–115 (2010);

## Fluid balance and acute kidney injury

John R. Prowle, Jorge E. Echeverri, E. Valentina Ligabo, Claudio Ronco and Rinaldo Bellomo



# SOVRACCARICO DI FLUIDI NEL DANNO RENALE ACUTO: TOSSINA SOTTOVALUTATA?

**Prof. Enrico Fiaccadori**

Dipartimento di Clinica Medica & Nefrologia di Parma  
Parma

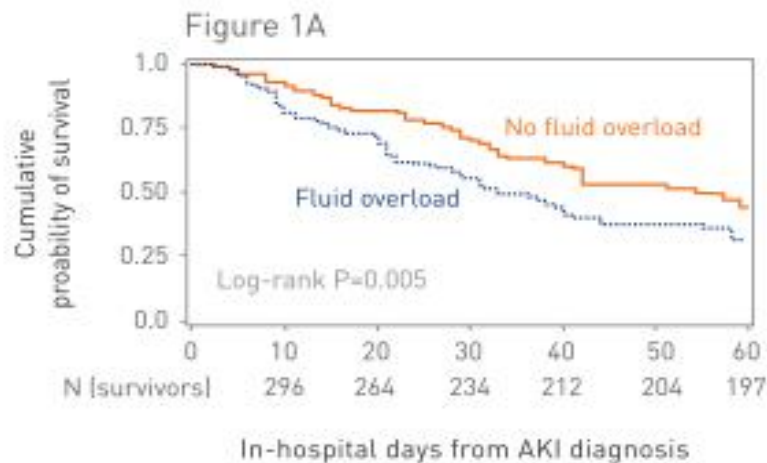
**Table 2** | Publications describing two groups of critically ill patients with differing fluid balances where a renal outcome was reported\*

Reference	Study type	Population	n	Average fluid balance in less-positive group	Average fluid balance in more-positive group	Renal function measure	Renal outcome with more-restrictive fluid balance strategy	Principal outcome with more-restrictive fluid balance strategy
ARDS Clinical Trials Network (2006) <sup>68</sup>	Multicenter RCT	ARDS	1,000	-136 ml on day 7	+6,992 ml on day 7	Need for RRT; change in creatinine	No difference	Shorter duration of ventilation and ICU stay
Martin et al. (2005) <sup>69</sup>	Single-center RCT	Mixed ALI	40	-5,480 ml on day 5	-1,490 ml on day 5	Change in creatinine	No difference	Improved oxygenation
Martin et al. (2002) <sup>65</sup>	Single-center RCT	ALI after trauma	37	-3,300 ml on day 5	+500 ml on day 5	Change in creatinine	No difference	Improved oxygenation
Mitchell et al. (1992) <sup>127</sup>	Single-center RCT	Mixed ICU needing PAC	102	+142 ml	+2,239 ml	Change in creatinine	Small rise in creatinine	Shorter duration of ventilation and ICU stay
Bouchard et al. (2009) <sup>25</sup>	Retrospective observational	Mixed ICU with AKI	542	<10% rise	>10% rise	Dialysis independence	Improved	Decrease in mortality
Payen et al. (2008) <sup>6</sup>	Retrospective observational	Mixed ICU with or without AKI	3,147	-1,000 ml	+3,000 ml	Renal SOFA score	Improved	Decrease in mortality in patients with AKI
Vidal et al. (2008) <sup>72</sup>	Prospective observational	Mixed ICU with elevated or normal IAP	83	+5,000 ml	+9,000 ml	Renal SOFA score	Improved	Normal IAP associated with less organ failure and shorter ICU stay
Adesanya et al. (2008) <sup>128</sup>	Retrospective observational	Surgical ICU	41	+5 kg	+8.3 kg	Change in creatinine	No difference	Shorter duration of ventilation and ICU stay
McArdle et al. (2007) <sup>67</sup>	Retrospective observational	Surgical ICU	100	+7,500 ml	+10,000 ml	Change in creatinine	No difference	Decrease in postoperative complications
Arlati et al. (2007) <sup>92</sup>	Prospective observational	Burns ICU	24	+7,500 ml	+12,000 ml	Urine output	No difference	Decrease in organ dysfunction score

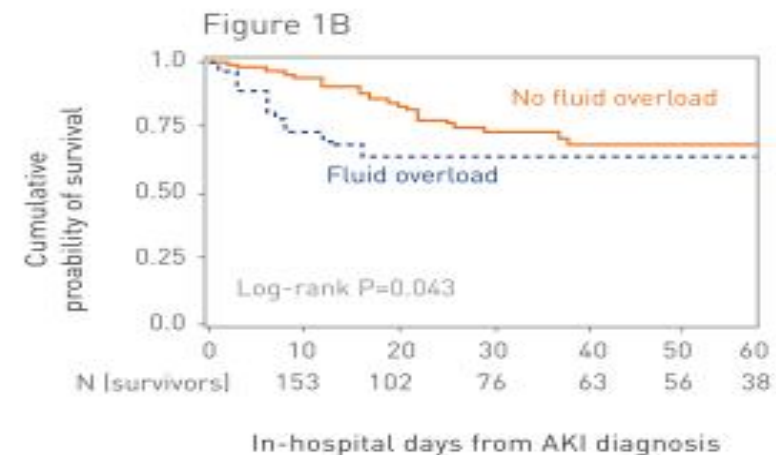
\* See Supplementary Information online for systematic search strategy. Abbreviations: AKI, acute kidney injury; ALI, acute lung injury; ARDS, acute respiratory distress syndrome; IAP, intra-abdominal pressure; ICU, intensive care unit; PAC, pulmonary artery catheter; RCT, randomized, controlled trial; RRT, renal replacement therapy; SOFA, sequential organ failure assessment.

# Fluid accumulation, survival and recovery of kidney function in critically ill patients with acute kidney injury

Josée Bouchard<sup>1</sup>, Sharon B. Soroko<sup>1</sup>, Glenn M. Chertow<sup>2</sup>, Jonathan Himmelfarb<sup>3</sup>, T. Alp Ikizler<sup>4</sup>, Emil P. Paganini<sup>5</sup> and Ravindra L. Mehta<sup>1</sup>, Program to Improve Care in Acute Renal Disease (PICARD) Study Group



PAZIENTI IN DIALISI



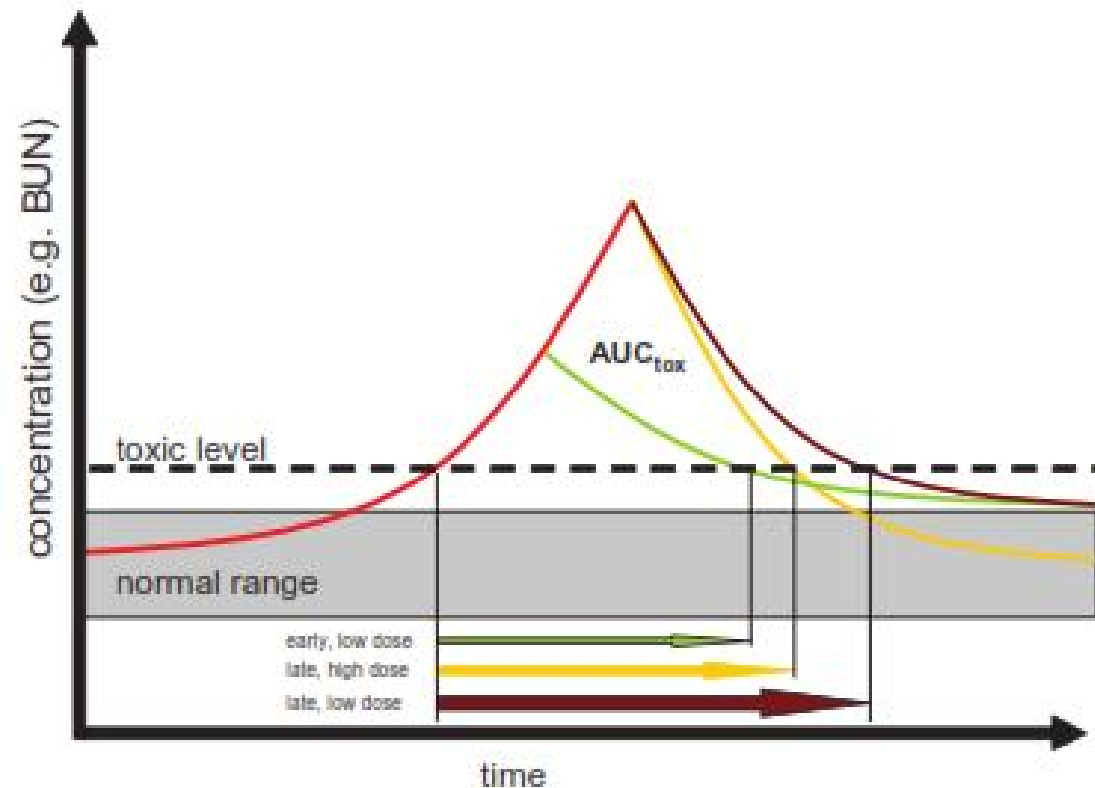
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**CONCLUSIONI: un incremento del «fluid overload» (10% del peso corporeo rispetto al basale) E' ASSOCIATO INDIPENDENTEMENTE ALLA MORTALITA'**

REVIEW

# Clinical review: Timing of renal replacement therapy

Michael Joannidis\*<sup>1</sup> and Lui G Forni<sup>2</sup>



**Figure 2. Influence of timing and dosing on exposure to uremic toxins.**  $AUC_{tox}$  is the area under the curve of the respective toxins, and early, low dose renal replacement therapy may result in lower  $AUC_{tox}$  than late, high dose renal replacement therapy. BUN, blood urea nitrogen.



Original Articles

**Severe acute kidney injury not treated with renal replacement therapy: characteristics and outcome**

Antoine G. Schneider<sup>1,2</sup>, Shigehiko Uchino<sup>3</sup> and Rinaldo Bellomo<sup>1,2</sup>

RIFLE-F and no RRT: who and why?

STUDIO RETROSPETTIVO-OSSERVAZIONALE  
 «REAL LIFE»

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**Table 1.** Characteristics of patients with RIFLE-F AKI<sup>a</sup>

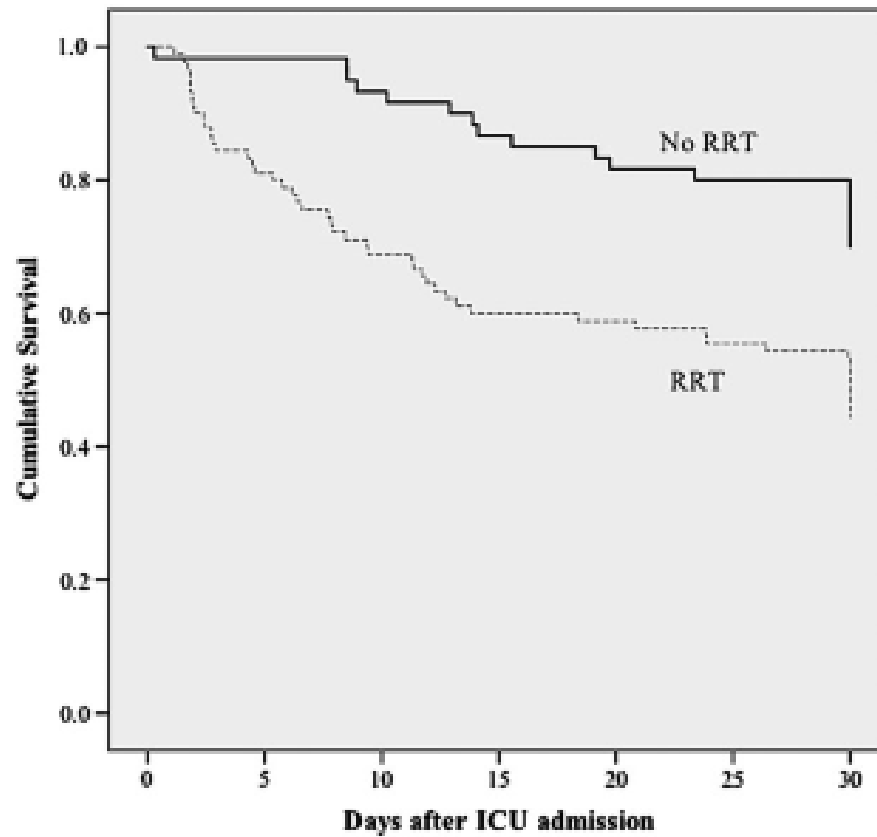
	Overall	RRT	All no-RRT	p <sup>b</sup>	No-RRT without LOMT	p <sup>c</sup>
<i>N</i>	195	90	105		60	
Age (mean, SD)	66.6 ± 15.3	64.6 ± 16.3	68.5 ± 14.15	0.09	68.7 ± 12.8	0.18
M/F ratio (% males)	112/83 (57.4%)	50/40 (55.5%)	62/43 (59.0%)	0.62	36/24 (60%)	0.59
Hospital LOS (median; IQR)	14.9; 21.5	17.3; 27.0	13.4; 24.4	0.10	21.7; 22.3	0.26
Medical/surgical (% medical)	113/82 (57.9%)	52/38 (57.8%)	61/44 (58.1%)	0.96	30/30 (50.0%)	0.35
Emergency versus elective admission	139/56 (71.3%)	57/33 (63.3%)	82/23 (78.1%) <sup>b</sup>	0.03	45/15 (75%)	0.5
Number of ICU admissions (mean, range)	1.17 (1–7)	1.2 (1–7)	1.15 (1–4)	0.63	1.19 (1–4)	0.98
Total ICU LOS (median, IQR)	4.2; 7.6	7.9; 13.7	2.7; 3.7 <sup>c</sup>	<0.001	3.4; 5.5 <sup>c</sup>	<0.001
APACHE II (mean, SD)	23.0 ± 8.4	23.4 ± 9.6	22.5 ± 7	0.55	20.2 ± 5.7 <sup>c</sup>	<0.001
APACHE III (mean, SD)	84.6 ± 27.8	86.7 ± 30.9	82.7 ± 24.5 <sup>b</sup>	<0.05	74.8 ± 19.2 <sup>c</sup>	<0.001
Mechanical ventilation	122/195 (62.6%)	63/90 (70.0%)	59/105 (56.2%)	0.04	30/60 (50.0%) <sup>b</sup>	0.01
In-hospital mortality	111/195 (56.9%)	50/90 (55.5%)	61/105 (58.1%)	0.72	18/60 (30.0%) <sup>b</sup>	0.002

Limitations of Medical Therapy +  
 Previsione di ripristino funzione renale

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**30%  
VS  
55,5%**

Escludendo i pazienti LOMT  
«con «Limitations of medical Therapy»

## RISCHI trattamento sostitutivo renale

Ipotensione (e conseguente peggioramento del danno renale)

Sanguinamento (dipendente dall'utilizzo di anticoagulanti)

Complicanze correlate all'uso di cateteri per emodialisi

Contatto del sangue con un circuito extracorporeo

Avvio precoce della RRT espone a rischi, mentre una ragionevole attesa potrebbe essere sufficiente al recupero funzionale renale spontaneo

Avvio precoce della RRT espone a rischi, mentre una ragionevole attesa potrebbe essere sufficiente per osservare la stessa sopravvivenza del paziente





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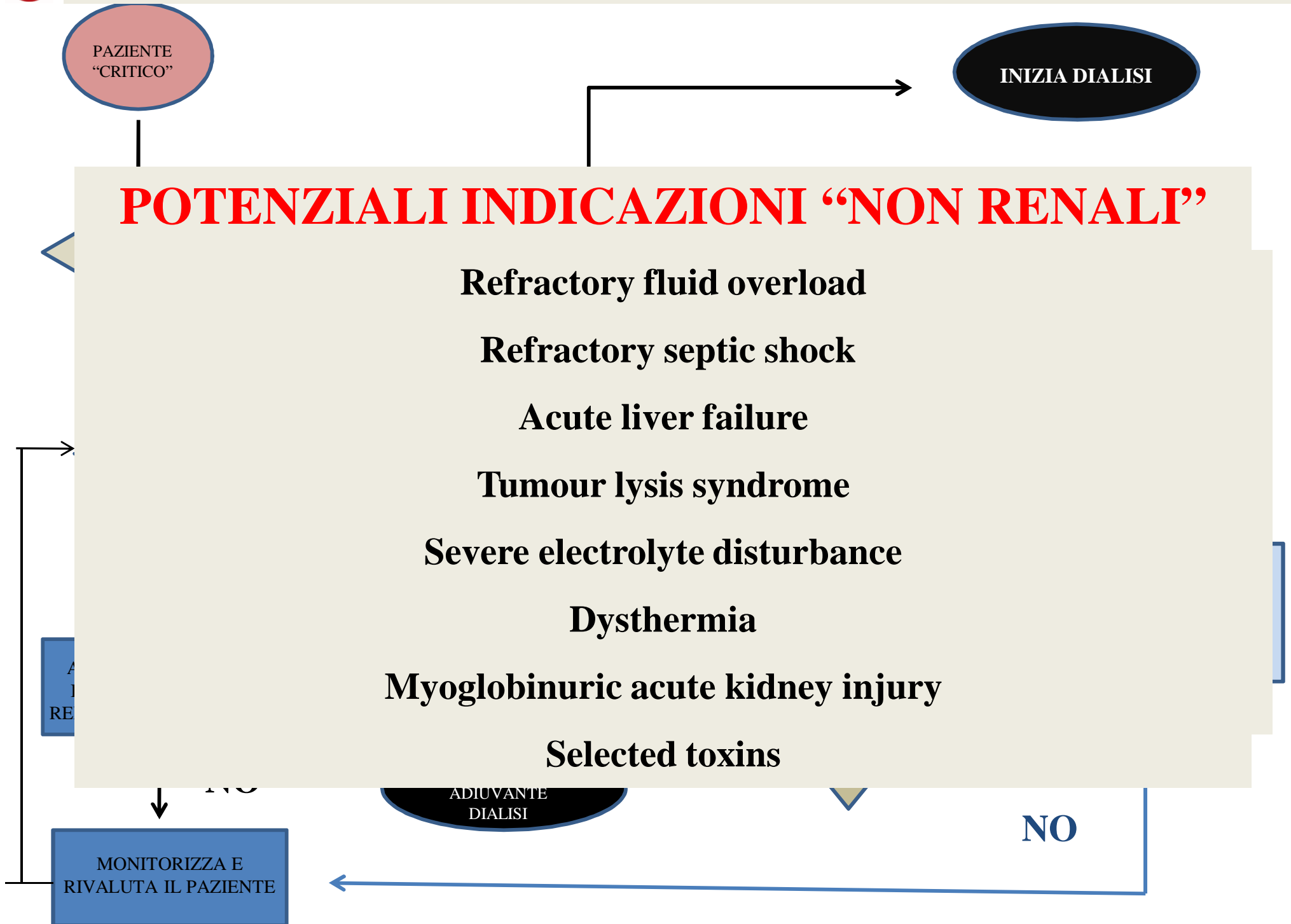
*In-Depth Clinical Review*

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Nephrology Dialysis Transplantation

## Identifying critically ill patients with acute kidney injury for whom renal replacement therapy is inappropriate: an exercise in futility?

Ezra Gabbay and Klemens B. Meyer

**Dialisi: quando NON  
iniziare?!**





## Medicina d'Urgenza AOU Policlinico Vittorio Emanuele di Catania



**In media 20/30 pazienti l'anno dal 2003**

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