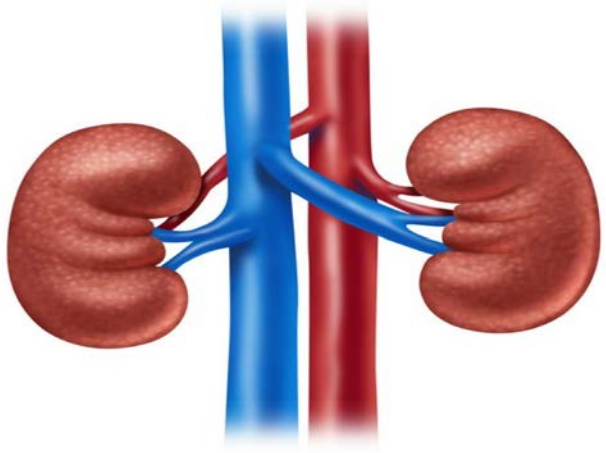
AER 2019

25ème AER : 19 & 20 novembre 2020

Quand débuter une EER ?



Pr Jean-Pierre Quenot

Service de Médecine Intensive-Réanimation

CHU Dijon

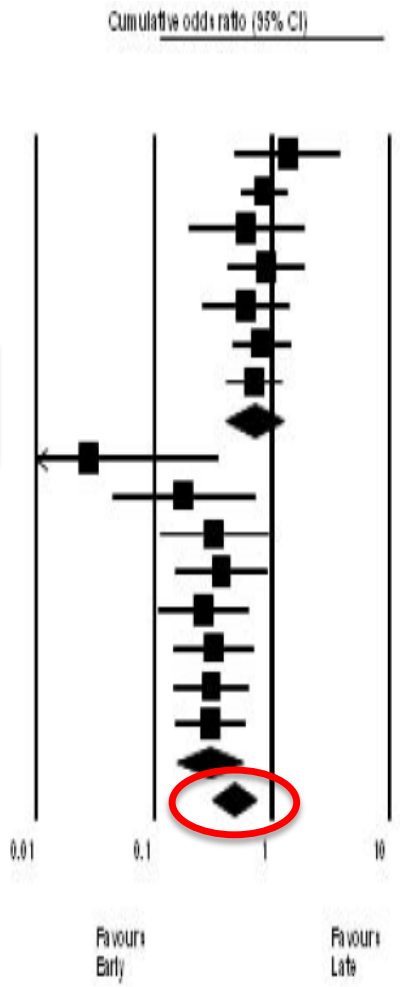
Aucun lien ni conflit d’intérêt à déclarer

Table 2. Summary of studies evaluating the timing of initiation of renal replacement therapy (RRT)

Study	Yr	Mode of RRT	Study Design	No.	Criteria for Initiation of RRT		Survival (%)	
					Early	Late	Early	Late
Parsons et al (20)	1961	IHD	Retrospective	33	BUN 120–150 mg/dL	BUN >200 mg/dL	75	12
Fischer et al (21)	1966	IHD	Retrospective	162	BUN ~150 mg/dL	BUN >200 mg/dL	43	26
Kleinknecht et al (22)	1972	IHD	Retrospective	500	BUN <93 mg/dL	BUN >163 mg/dL	73	58
Conger (23)	1975	IHD	RCT	18	BUN <70 mg/dL or S_{Cr} <5 mg/dL	BUN ~150 mg/dL, S_{Cr} ~10 mg/dL, or clinical indications	64	20
Gillum et al (24)	1986	IHD	RCT	34	S_{Cr} 8 mg/dL Treatment goal: BUN <60 mg/dL, S_{Cr} <5 mg/dL	BUN ~100 mg/dL or S_{Cr} ~9 mg/dL	41	53
Gettings et al (25)	1999	CRRT	Retrospective	100	BUN <60 mg/dL	BUN >60 mg/dL	39	20
Bouman et al (12)	2002	CRRT	RCT	106	<12 hrs after meeting AKI definition	BUN >112 mg/dL, S_K >6.5 mmol/L, or pulmonary edema	LV: 69 HV: 74	LV: 75
Demirkiliç et al (26)	2004	CRRT	Retrospective	61	UOP <100 mL/8 hr	S_{Cr} >5.0 mg/dL or S_K >5.5 mmol/L	77	45
Elahi et al (27)	2004	CRRT	Retrospective	64	UOP <100 mL/8 hr	BUN ≥4 mg/dL, S_{Cr} >2.8 mg/dL, or S_K >6 mmol/L	78	57
Piccinni et al (28)	2006	CRRT	Retrospective	80	<12 hrs after ICU admission	"Conventional" indications	55	28
Liu et al (29)	2006	IHD & CRRT	Observational	243	BUN ≤76 mg/dL	BUN >76 mg/dL	65	59

Palevsky PM Crit Care Med 2008

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



Karvellas CJ Crit Care 2011

Chapter 5.1: Timing of renal replacement therapy in AKI

5.1.1: Initiate RRT emergently when life-threatening changes in fluid, electrolyte, and acid-base balance exist. (*Not Graded*)

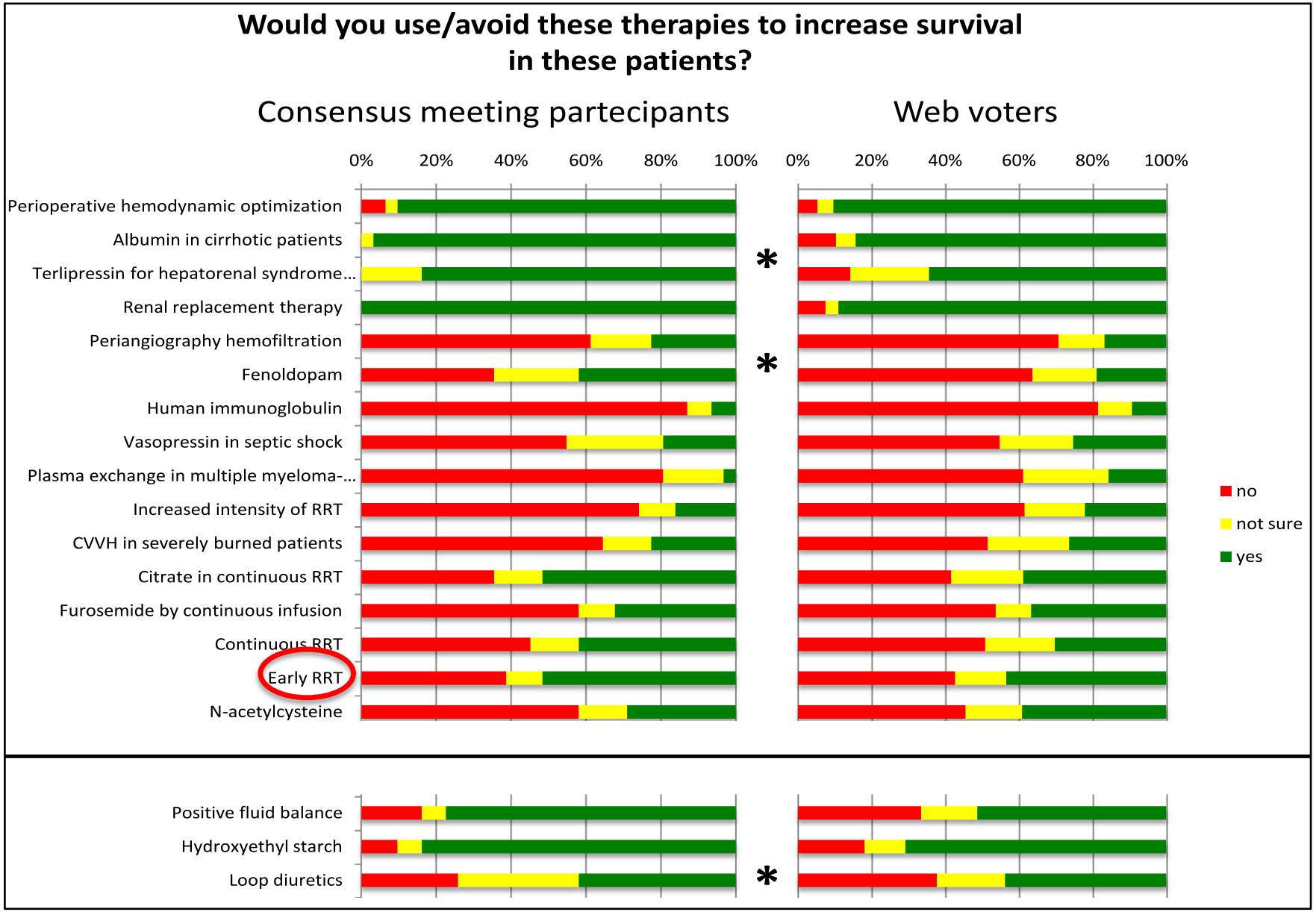
5.1.2: Consider the broader clinical context, the presence of conditions that can be modified with RRT, and trends of laboratory tests—rather than single BUN and creatinine thresholds alone—when making the decision to start RRT. (*Not Graded*)

KDIGO AKI Work Group Kidney Int 2012;2:1-138

- « **PRECOCE**» initiation de l'EER au stade **KDIGO 2** ou dans les 24 heures suivant l'apparition d'une IRA dont la réversibilité semble peu probable *(Avis d'expert)* ***Accord faible***

- « **TARDIVE** » initiation de l'EER à plus de 48 heures de la survenue d'une IRA au stade **KDIGO 3** *(Avis d'expert)* ***Accord faible***

Vinsonneau C et al Réanimation 2014;23:714-33


Would you use/avoid these therapies to increase survival in these patients?
Consensus meeting partecipants
Web voters
0%
20%
40%
60%
80%
100%
Perioperative hemodynamic optimization
Albumin in cirrhotic patients
Terlipressin for hepatorenal syndrome...
Renal replacement therapy
Periangiography hemofiltration
Fenoldopam
Human immunoglobulin
Vasopressin in septic shock
Plasma exchange in multiple myeloma-...
Increased intensity of RRT
CVVH in severely burned patients
Citrate in continuous RRT
Furosemide by continuous infusion
Continuous RRT
Early RRT
N-acetylcysteine
Positive fluid balance
Hydroxyethyl starch
Loop diuretics
*
*
*
no
not sure
yes

Epidémiologie de l'IRA en Réanimation ?

57.3 % avec IRA
13 % EER

Stage	Serum creatinine	Urine output
1	1.5–1.9 times baseline OR ⩾0.3 mg/dl (⩾26.5 µmol/l) increase	<0.5 ml/kg/h for 6–12 hours
2	2.0–2.9 times baseline	<0.5 ml/kg/h for ⩾12 hours
3	3.0 times baseline OR Increase in serum creatinine to ⩾4.0 mg/dl (⩾353.6 µmol/l) OR Initiation of renal replacement therapy OR, In patients <18 years, decrease in eGFR to <35 ml/min per 1.73 m²	<0.3 ml/kg/h for ⩾24 hours OR Anuria for ⩾12 hours

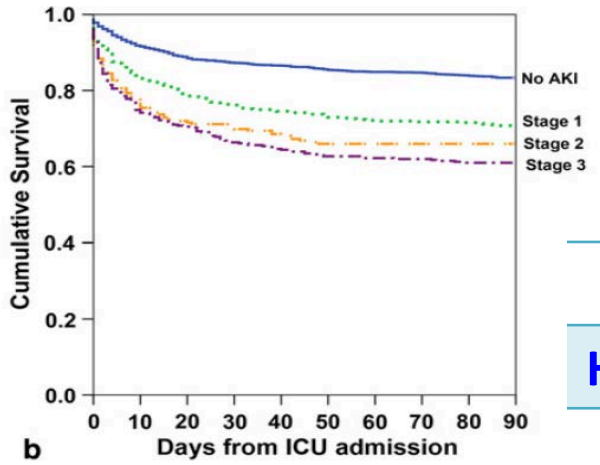
39 % avec IRA
10 % EER

Hoste EAJ et al. ICM 2015
AKI-EPI (n=1800)

KDIGO

Nisula S et al. ICM 2013
FINNAKI (n=2900)

	AKI	N-AKI
H. Death (%)	27	7



	AKI	N-AKI
H. Death (%)	26	10

	NUTRIREA 2 (Reignier J Lancet 2017) **N=2410**	**APROCCHSS** (Annane D NEJM 2018) **N=1241**
EER	**35**	**27**

ACUTE KIDNEY INJURY

IDEAL timing of renal replacement therapy in critical care

Lui G. Forni and Michael Joannidis

Box 1 | 'Early' renal replacement therapy in critically ill patients with acute kidney injury

Advantages

- Control of electrolyte abnormalities
- Control of acid–base derangement
- Control of uraemia
- Control of volume overload
- Avoidance of excessive diuretic usage
- Potential clearance of inflammatory mediators

Disadvantages

- Risks associated with dialysis catheter insertion
- Adverse effects of anticoagulation
- Potential pro-inflammatory effects owing to blood–membrane interactions
- Enhanced or unknown effects on the clearance of drugs, including antibiotics
- Loss of micronutrients
- Exposure to the extracorporeal circuit in patients who may not need therapy
- Increased resource utilization
- Increased costs

Nature reviews/Nephrology 2019

Stratégie PRECOCE voir URGENTE

Intoxication médicamenteuse
Ethylène glycol, Méthanol,
Lithium, Metformine, Aspirine
Hypercalcémie
Syndrome de lyse tumoral

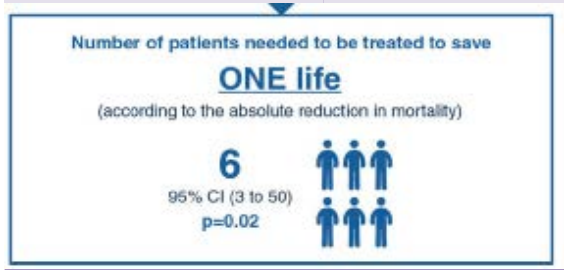
↓

Hyperkaliémie
OAP

↓

Acidose métabolique

	N Patient	Inclusion	Outcome (%)
BICAR-ICU (S. Jaber Lancet 2018)	389	pH≤7.20 et $PaCO_2$ ≤45 et RA ≤20 mmol/l SOFA ≥4 et lactate ≥2 mmol/l	**Mortalité J28** 54 (contrôle) vs 45 (Bicar.) **Mortalité J28 (KDIGO 2-3)** 63 (contrôle) vs 46 (Bicar.) **EER (contrôle vs Bicar.)** 52 vs 35 (p=0.0009)



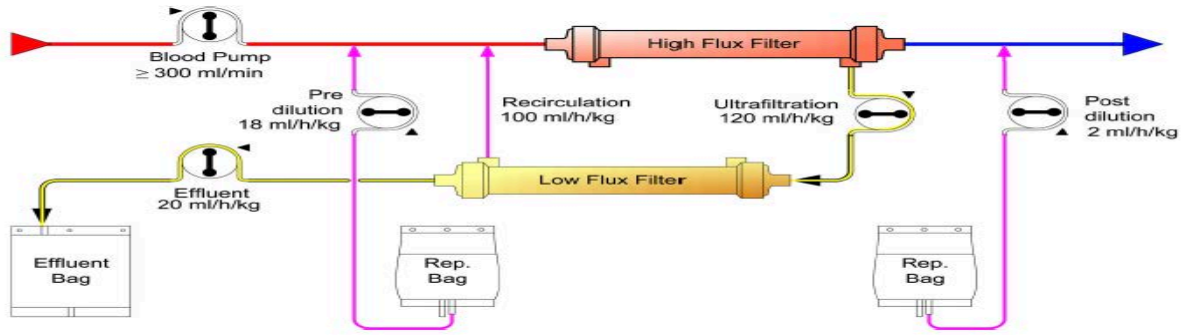
Stratégie PRECOCE : CHOC sans IRA

Payen D. et al
CCM 2009

80 patients	Intervention	Résultat
	HF 25 ml/Kg/h 96 h versus traitement conventionnel	SOFA ↑ HF Cytokines ≈

Combes A. et al
AJRCCM 2015

224 patients	Intervention	Résultat
	HF 80 ml/Kg/h 48 h versus traitement conventionnel	Décès à J30 NS



Quenot JP et al
ICM 2015

60 patients	Intervention	Résultat
	HF 120 ml/Kg/h 72 h versus traitement conventionnel	Sevrage cathéco. NS Cytokines ≈

Stratégie PRECOCE : CHOC avec IRA

EER Haut Volume

	N patients	Stade IRA	Intervention	Mortalité J28 (%)	P
Zhang P NDT 2012	280	?	CVVH 85 vs 50 ml/kg/h	57.4 vs 58.3	NS
IVOIRE ICM 2013	140	≥I RIFLE	CVVH 70 vs 35 ml/kg/h	37.9 vs 40.8	NS
HICORES AJK 2016	212	>I RIFLE	CVVH 80 vs 40 ml/kg/h	65.7 vs 64.5	NS

Stratégie PRECOCE vs ATTENTE : Sans CHOC avec IRA

EER Volume « normal »

AJKD

Original Investigation

Earlier-Start Versus Usual-Start Dialysis in Patients With Community-Acquired Acute Kidney Injury: A Randomized Controlled Trial

Tukaram E. Jamale, MD, DM, Niwrutti K. Hase, MD, DNB, Manjunath Kulkarni, MD, K.J. Pradeep, MD, Vaibhav Keskar, MD, Sunil Jawale, MD, and Dinesh Mahajan, MD

	N patients	**Précoce**	**Patients non épurés**	**Mortalité** (%) P vs différé
JAMALE AJKD 2013	208	Urée >25 mmol/l Ou Créat. > 619 umol/l	17%	20.5 vs 12.2 J90 (NS)

Stratégie PRECOCE vs ATTENTE : CHOC avec IRA

ORIGINAL ARTICLE

Timing of Renal-Replacement Therapy in Patients with Acute Kidney Injury and Sepsis

S.D. Barbar, R. Clere-Jehl, A. Bourredjem, R. Hernu, F. Montini, R. Bruyère, C. Lebert, J. Bohé, J. Badie, J.-P. Eraldi, J.-P. Rigaud, B. Levy, S. Siami, G. Louis, L. Bouadma, J.-M. Constantin, E. Mercier, K. Klouche, D. du Cheyron, G. Piton, D. Annane, S. Jaber, T. van der Linden, G. Blasco, J.-P. Mira, C. Schwebel, L. Chimot, P. Guiot, M.-A. Nay, F. Meziani, J. Helms, C. Roger, B. Louart, R. Trusson, A. Dargent, C. Binquet, and J.-P. Quenot, for the IDEAL-ICU Trial Investigators and the CRICS TRIGGERSEP Network*

IDEAL-ICU

France

ORIGINAL ARTICLE

Initiation Strategies for Renal-Replacement Therapy in the Intensive Care Unit

Stéphane Gaudry, M.D., David Hajage, M.D., Fréderique Schortgen, M.D., Laurent Martin-Lefevre, M.D., Bertrand Pons, M.D., Eric Boulet, M.D., Alexandre Boyer, M.D., Guillaume Chevrel, M.D., Nicolas Lerolle, M.D., Ph.D., Dorothée Carpentier, M.D., Nicolas de Prost, M.D., Ph.D., Alexandre Lautrette, M.D., Anne Bretagnol, M.D., Julien Mayaux, M.D., Saad Nseir, M.D., Ph.D., Bruno Megarbane, M.D., Ph.D., Marina Thirion, M.D., Jean-Marie Forel, M.D., Julien Maizel, M.D., Ph.D., Hodane Yonis, M.D., Philippe Markowicz, M.D., Guillaume Thiery, M.D., Florence Tubach, M.D., Ph.D., Jean-Damien Ricard, M.D., Ph.D., and Didier Dreyfuss, M.D., for the AKIKI Study Group*

STARRT-AKI

Canada

EER Volume « normal »

AKIKI

France

Smith et al. Trials 2013, 14:320
http://www.trialsjournal.com/content/14/1/320

TRIALS

STUDY PROTOCOL Open Access

Standard versus accelerated initiation of renal replacement therapy in acute kidney injury (STARRT-AKI): study protocol for a randomized controlled trial

Orla M Smith[1,2], Ron Wald[2,3,4], Neill KJ Adhikari[5], Karen Pope[6], Matthew A Weir[7,8], Sean M Bagshaw[9*] on behalf of the Canadian Critical Care Trials Group

ELAIN

Allemagne

Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Early vs Delayed Initiation of Renal Replacement Therapy on Mortality in Critically Ill Patients With Acute Kidney Injury

The ELAIN Randomized Clinical Trial

Alexander Zarbock, MD; John A. Kellum, MD; Christoph Schmidt, MD; Hugo Van Aken, MD; Carola Wempe, PhD; Hermann Pavenstädt, MD; Andreea Boanta, MD; Joachim Gerß, PhD; Melanie Meersch, MD

Stratégie PRECOCE vs ATTENTE : CHOC avec IRA

EER volume normal

AKIKI

VM et/ou catécholamines
KDIGO3
EER précoce < 6 h
EER différé (oligurie ou anurie >72 h après rando, urée > 40mmol/l, K> 6 mmol/l, pH < 7.15, OAP)

IDEAL

C. Septique < 48 h
F de RIFLE <12 h
EER précoce < 12h
EER différé 48-60 h (si indication d'EER)

ELAIN

KDIGO2+NGAL>150ng/ml + 1 critère (SS, catécho, OAP, SOFA ≥2)
EER précoce <8 h KDIGO 2
EER différé < 12 h KDIGO 3
ou si indication absolue

	N patients	SOFA	VM (%)	Vaso. (%)
AKIKI	619	11	86	85
IDEAL-ICU	488	12	88	100
ELAIN	231	15	87	88

Stratégie PRECOCE vs ATTENTE : CHOC avec IRA

EER volume normal

	N patients	Délai mise en route EER (h)	Mortalité (%) P vs différé	Patients non épurés (%)
AKIKI	619 (311 vs 308)	4.3 vs 57	48.5 vs 49.7 *J60*-NS	151 (49)
IDEAL-ICU	488 (246 vs 242)	7.6 vs 51.5	58 vs 54 *J90-NS*	93 (38)
ELAIN	231 (112 vs 119)	6.0 vs 25.5	39.3 vs 54.7 *J90-S*	11 (5)

Stratégie PRECOCE vs ATTENTE : CHOC avec IRA

EER volume normal

IDEAL

Table S5. Detailed List of Reasons for Not Initiating RRT

Reasons — no.	Early RRT (N=7)	Delayed RRT (N=93)
Spontaneous recovery of renal function	4	70
Death before initiation of RRT	2	18
Withdrawal of life support	0	3
Catheter insertion failure	1	0
Missing data he patient left the ICU before the time for starting renal replacement therapy	0	1
Missing data	0	1

Stratégie PRECOCE vs ATTENTE : CHOC avec IRA

SECURITE

Hyperkaliémie
Acidose métabolique
OAP

Groupe différé

	Hyperkaliémie	Acidose métabolique	OAP
AKIKI	27 (17)	33 (21)	9 (6)
IDEAL-ICU	9 (4)	20 (8)	6 (2)

Stratégie PRECOCE vs ATTENTE : CHOC avec IRA

SECURITE

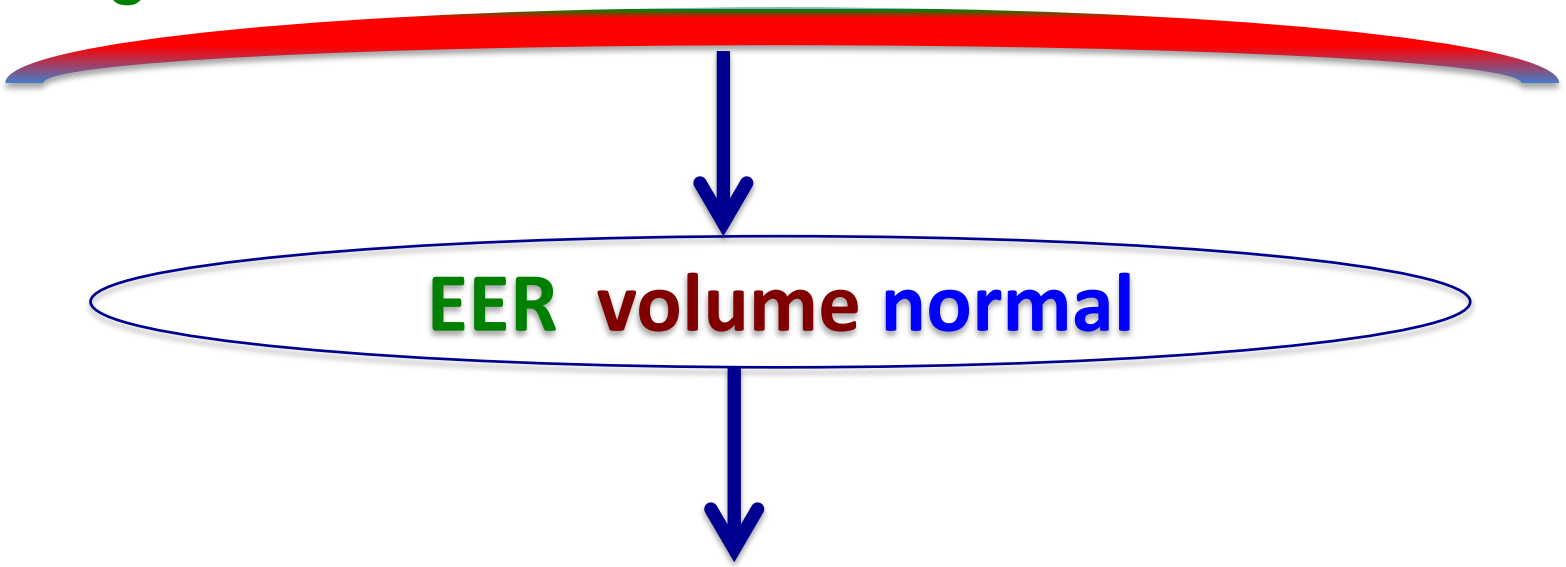
Hyperkaliémie
Acidose métabolique
OAP

E L A I N

eTable S1: Advanced inclusion criteria for dialysis initiation

	Early (n=112)	Delayed (n=119)	Absolute difference	p-value
Fluid overload or worsening pulmonary edema, No. (%)	82 (73.2)	93 (78.2)	-4.9% [-16.0%, 6.1%]	0.38

Stratégie PRECOCE vs ATTENTE : CHOC avec IRA



	N patients	Dépendance à l'EER (%)	p
AKIKI	619 (311 vs 308)	2 vs 5 (J60)	NS
IDEAL-ICU	488 (246 vs 242)	2 vs 3 (sortie H)	NS

Stratégie PRECOCE vs ATTENTE

En COURS D'ANALYSE

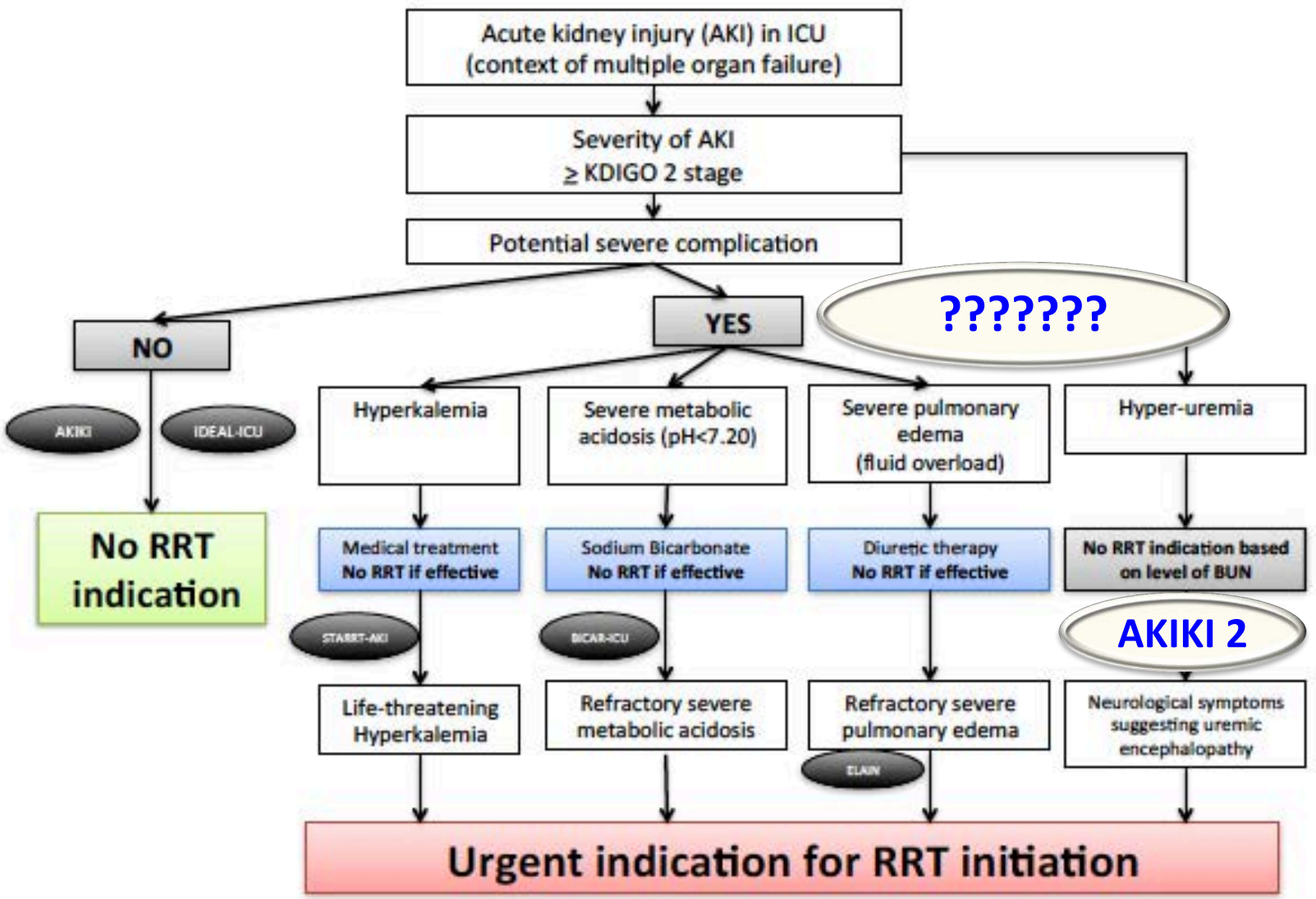
	N patients	Inclusion
AKIKI 2 (D. Dreyfuss)	270	**Noradrenaline et/ou VM** **KDIGO 3** + urée >40 mmol/l ou oligo-anurie > 72 h **Précoce** < 6 h **Différé** si urée > 50 mmol/l + critère d'urgence
STARRT-AKI (R. Wald)	2866	**KDIGO ≥2** **Précoce** <12 h **Différé** (K≥6 mmol/l, pH <7.20, OAP, AKI > 50% base /> 3jrs)

Quand débuter une EER ?

- *Similar to sepsis and ARDS, the time has come for AKI to go deeper into the fiels of **personnalized medicine**.* Uhel F ATM 2018
- *The real « IDEAL » trial, of course, would be one identifying a drug or treatment that prevents clinicians from having to make the decision to dialyze in the first place by **preventing AKI**.* lLeaf DE ASN 2019
- *Until then, decisions regarding when to initiate RRT must remain based on **individual patient characteristics and clinician judgment**.* Palevsky PM. CJASN 2016
- *Sometimes less (dialysis) is more. As the basic and primary directive of medicine guides us **PRIMUM NON NOCERE**.* Bielopolski D. JTD 2016

Timing of Renal Replacement Therapy for Severe Acute Kidney Injury in Critically Ill Patients

CONCLUSION



Gaudry S, Quenot JP, Hertig A, Barbar SD, Hajaje D, Ricard JD, Dreyfuss D. AJRCCM 2019

Enquête de pratiques DIAM

DIAlyse : enquête des pratiques Médicales en Réanimation

- **2014 :** Recommandations (RFE : SRLF, SFAR, GFRUP, SFNDT)
- **2014-2109 :** Pratiques Médicales hétérogènes en Dialyse aigue
- **2019 :** Enquêtes en ligne sur les pratiques Médicales DIAM
  - Volet Chef de Service / Referent Dialyse
  - Volet Praticien

Contact : Dr Christophe Vinsonneau
cvinsonneau@ch-bethune.fr

SurveyMonkey

Enquête de pratiques DIAM

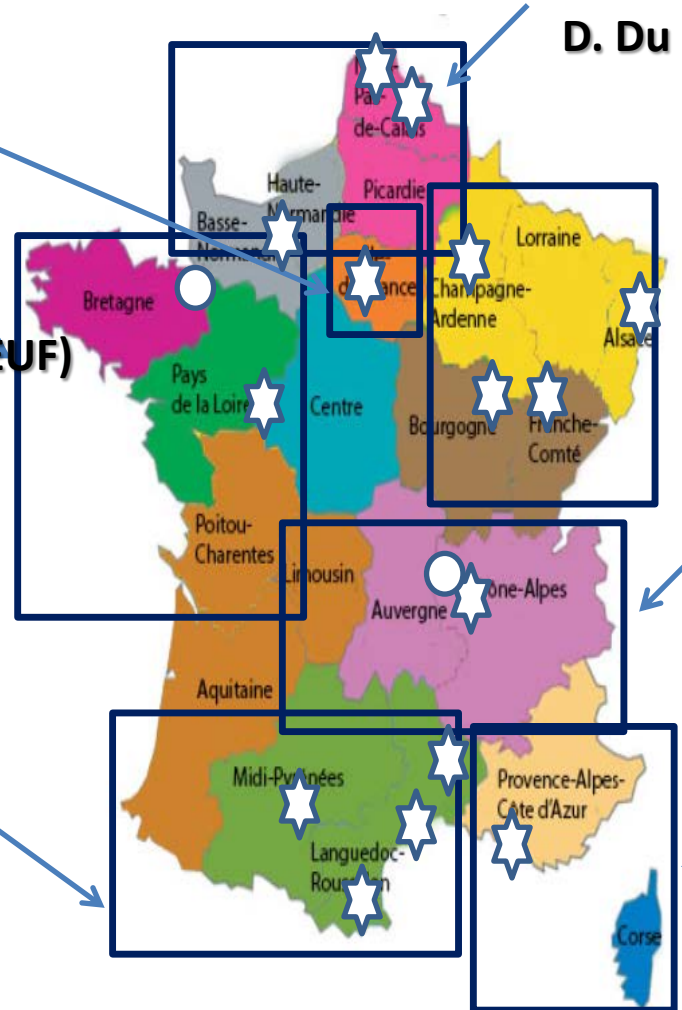
DIAlyse : enquête des pratiques Médicales en Réanimation

Ile de France :
J. Duranteau
E. Rondeau (FIRN)

Hauts de France, Normandie (réseau boréal)
D. Du Cheyron, C. Vinsonneau

Bretagne, Pays de Loire
R. Robert, P. Guyot (CREUF)
T. Gaillot (pédiatrie)

Bourgogne- franche Comté- Nord-Est, Centre :
JP. Quenot



Est-Auvergne :
B. Souweine, J. Bohé
Dr Javouhay (pédiatrie)

Languedoc Rousillon :
K. Klouche,
JY. Lefrant,
S jaber, S. Barbar

PACA
J. Dellamonica

☆ **Pédiatrie : T. Gaillot, E. Javouhey**

○ **FIRN : E. Rondeau**