

Complexité de la prescription diététique en réanimation pédiatrique Cas particulier du patient assisté par circulation extra corporelle

26 ème congrès de diététique et
support nutritionnel HUB

Shancy Rooze pédiatre



- Aucun conflit d'intérêt financier ou professionnel
- Participations aux guidelines européens et français de nutrition aux soins intensifs pédiatriques



Alessandro Pignocchi

Sujets abordés

- Patient et métabolisme
 - Voies d'abord nutritionnelles
 - Objectifs
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- La particularité des patients en circulation extracorporelle, 13 ans d'expérience à l'HUDERF
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- Le challenge est:
- Alimenter au bon moment** pour éviter de creuser la **dette nutritionnelle**, à un moment où le patient est **capable d'utiliser** le support nutritionnel

Quelles sont les spécificités métaboliques de ce patient?



- Maladie antérieure et état nutritionnel à l'admission
- Alitement
- Stress
- Catabolisme
- Médicaments
- By pass de fonction vitale par un support médical

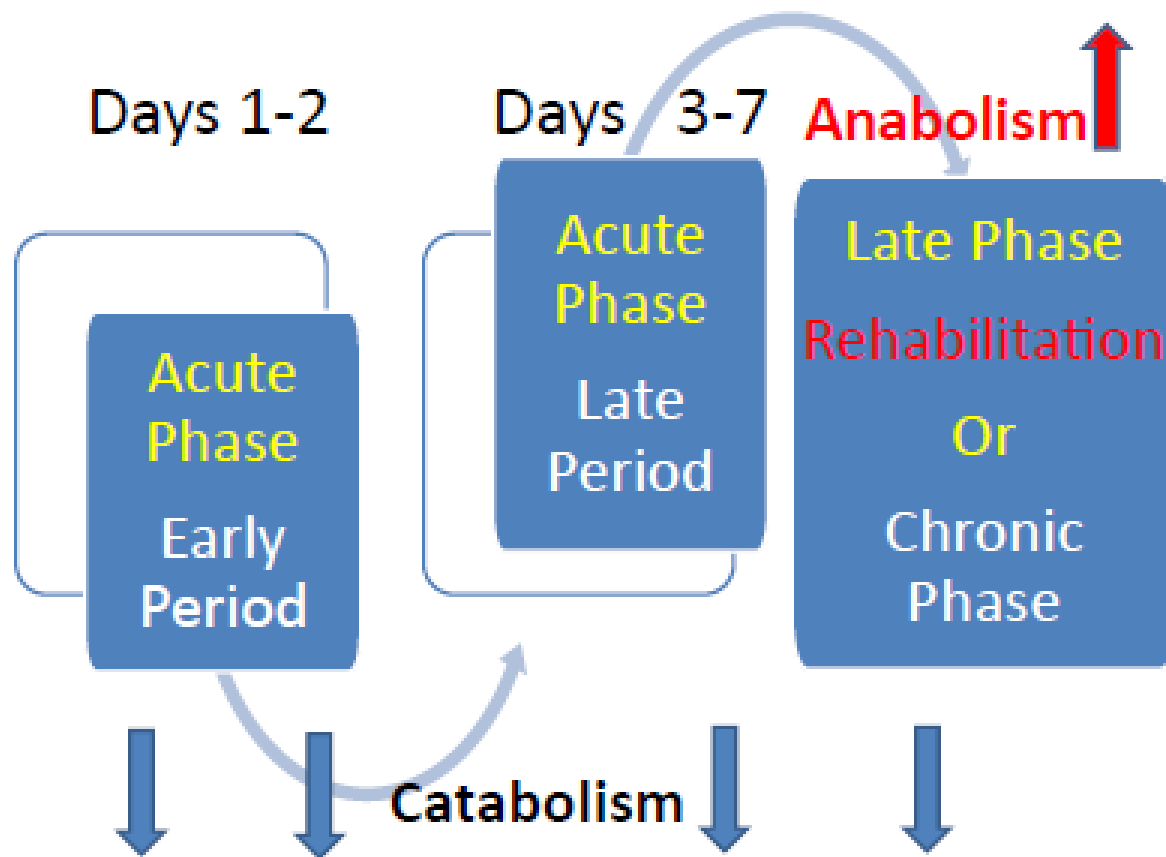


Fig. 2. Description of the acute and late phases following infection/stress/injury. After injury, the acute phase is composed of an early and a late period. Then the post-acute phase can be progressing to convalescence and rehabilitation or chronicity and Prolonged Inflammatory and Catabolic Syndrome (PICS).

Tume et al 2020 ESPNIC guidelines ICM:
Phase aiguë: besoin énergétique proche du métabolisme de base, phase chronique dépend de: la pathologie, activité physique, croissance, récupération

Schéma tiré de: ESPEN guideline of nutrition in ICU 2018 in Clinical nutrition

NARRATIVE REVIEW

Nutrition in the intensive care unit: from the acute phase to beyond



Angelique M. E. de Man^{1,2*}, Jan Gunst^{3,4} and Annika Reintam Blaser^{5,6}

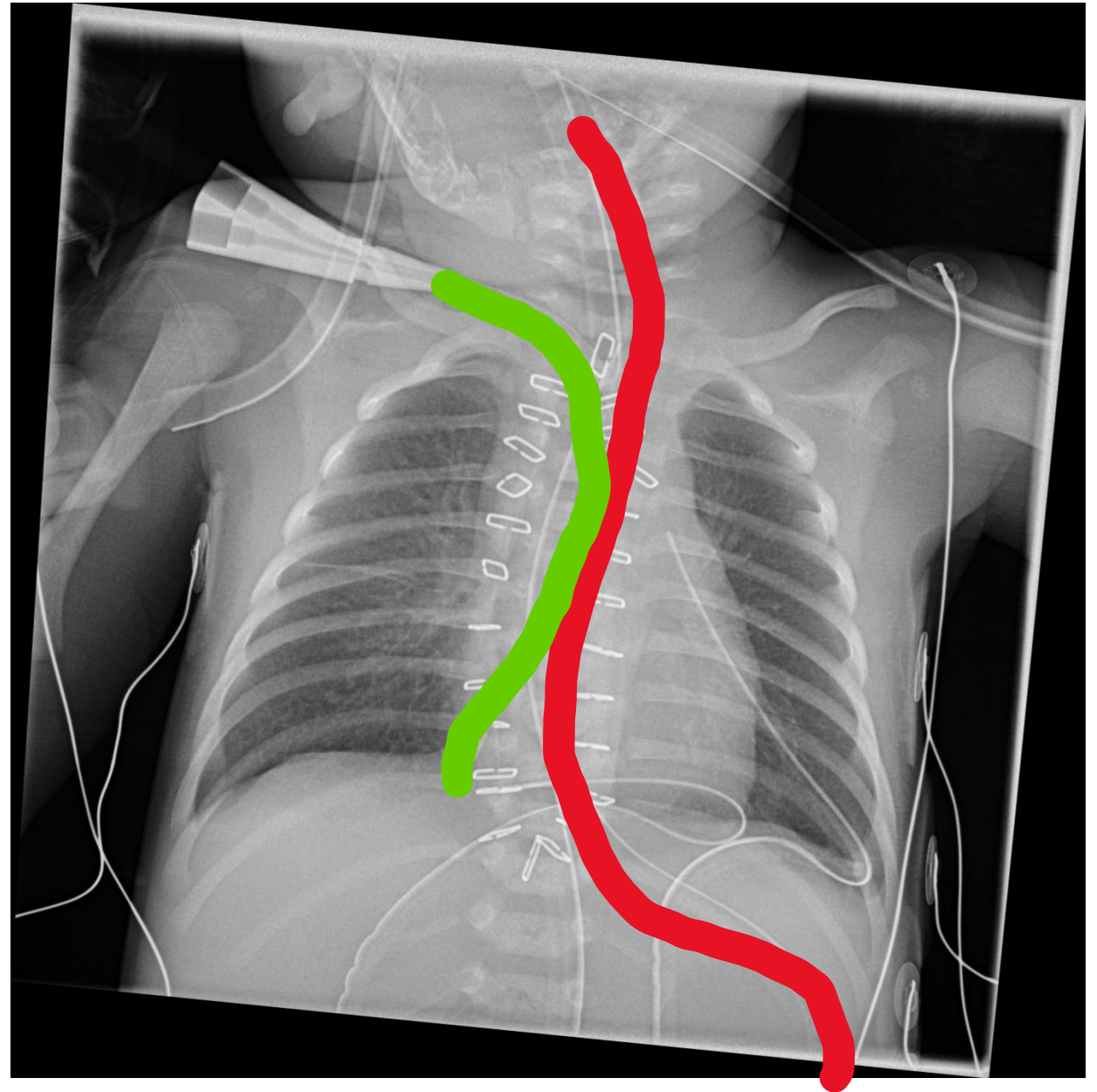
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Time point	ICU admission	Early ICU stay	Continuing ICU stay	ICU	ICU
Consider/check		EN possible? ¹	EN tolerated? ¹	Refeeding hypophosphatemia? ⁴	New hit? (e.g. shock)
Macronutrients	No nutrition (glucose if hypoglycemia)	Time point? Low-dose EN² EN not possible: low dose glucose if no non-nutritional energy?	Time point? Progressive increase toward target³ Time point? EN insufficient: start PN³	Temporarily reduce macronutrient intake ³ ; correct electrolyte abnormalities	Consider temporarily reducing or stopping macronutrient intake
Micronutrients		Maintenance dose ⁵	Maintenance dose ⁵	Maintenance dose ⁵ (higher dose of B1)	Maintenance dose ⁵

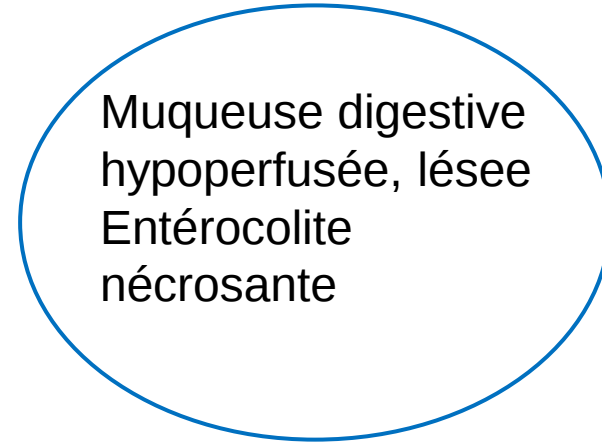
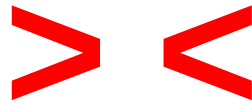
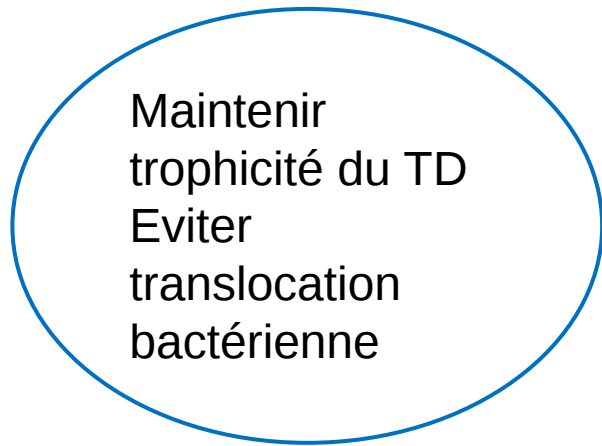
Quelles voies
d'abord?

Par la veine

Par le tube digestif



Challenges de la nutrition entérale



- Utiliser le tube digestif
- Favoriser la tolérance digestive

- Eviter les complications dangereuses
- Pas dans la même balance que l'intolérance digestive: nausée, ballonnement, constipation, diarrhée

Cibles caloriques

Review

Estimation of Resting Energy Expenditure Using Predictive Equations in Critically Ill Children: Results of a Systematic Review

Corinne Jotterand Chaparro, PhD^{1,2}; Clémence Moullet, BSc¹; Patrick Taffé, PhD³; Jocelyne Laure Depeyre, BSc¹; Marie-Hélène Perez, MD²; David Longchamp, MD²; and Jacques Cotting, MD²

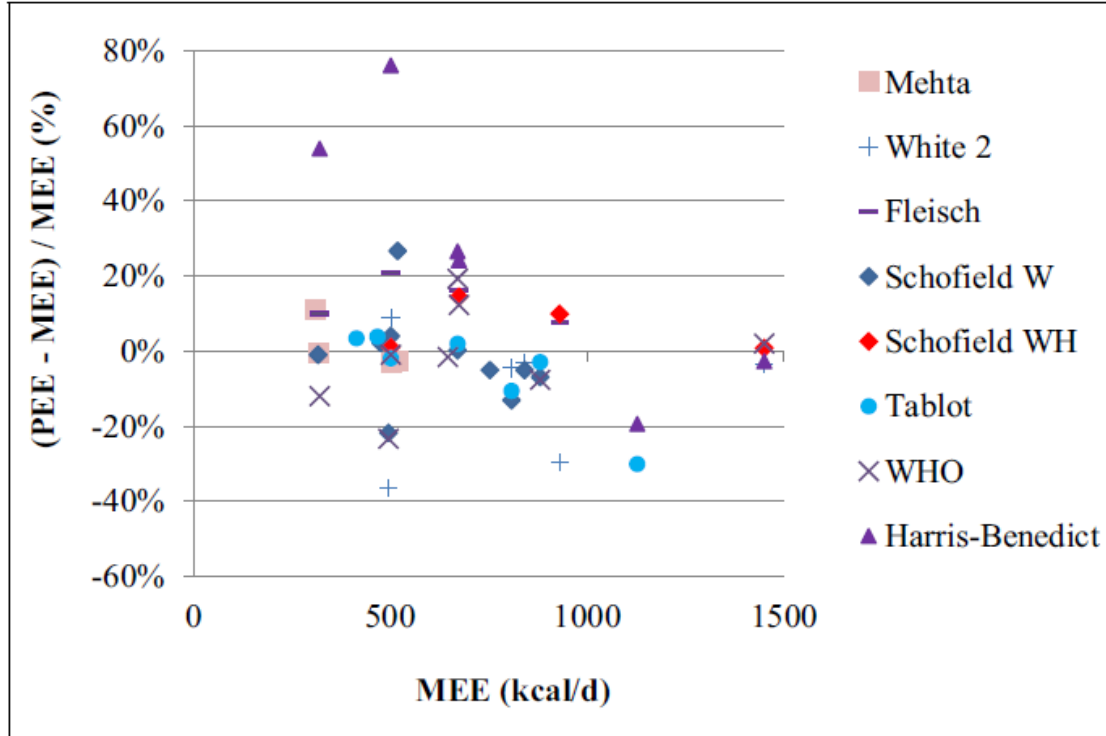
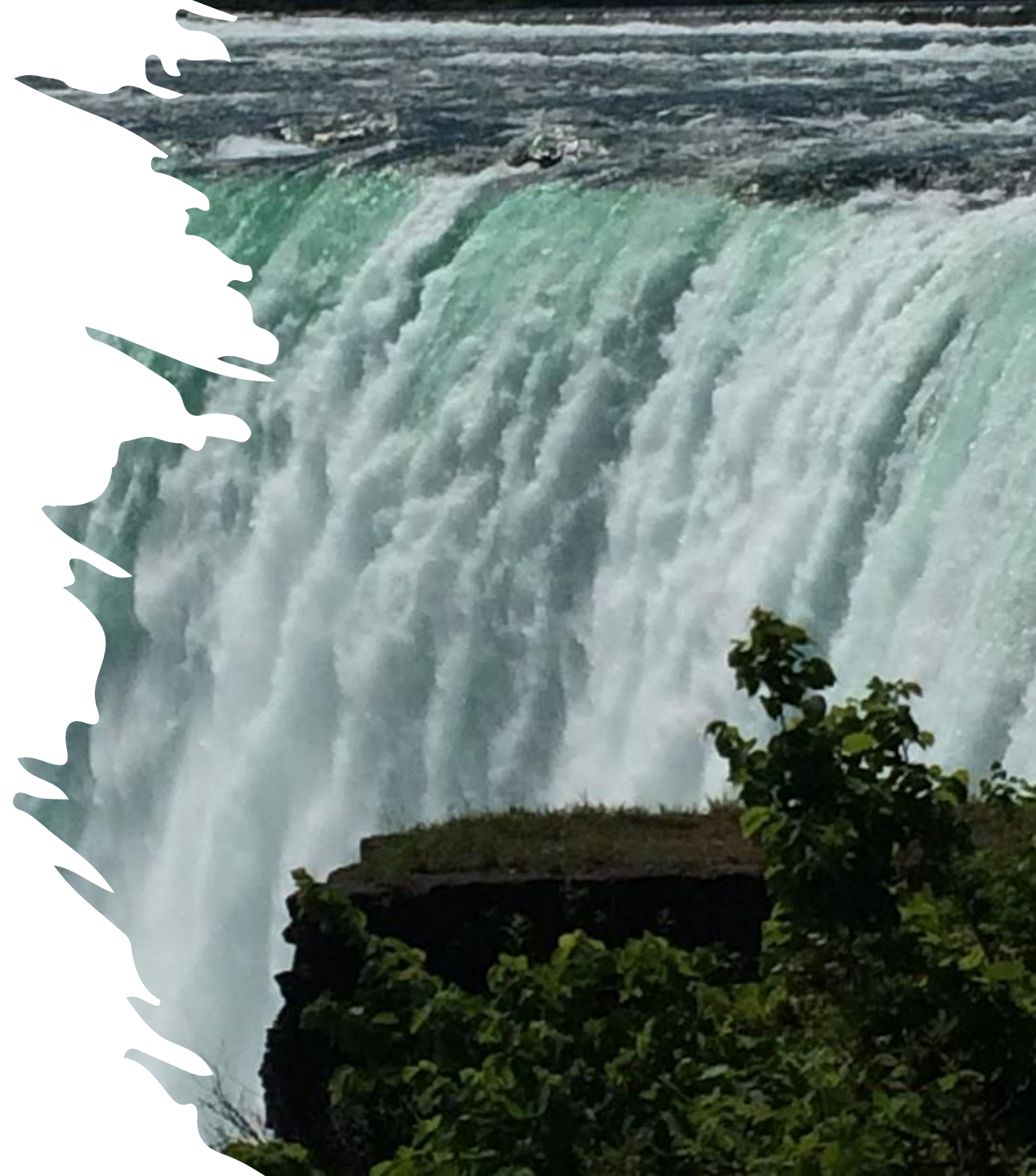


Figure 3. Percentage mean bias according to mean values of measured energy expenditure (MEE) for predictive equations examined by at least 3 studies Schofield W, Schofield weight; Schofield WH, Schofield weight and height; WHO, World Health Organization.

Types de diète

- Isocalorique, cad enrichi par rapport à régime normal
- Polymérique
- Parfois hyperprotéiques
- Restriction hydrique: challenge majeur
- Alimentation de base en dessous de l'isocalorique



Enteral nutrition and gastrointestinal complications of children receiving extracorporeal support: the role of lactate

- Etude rétrospective
- HUDERF
- 2011-2023
- 127 patients



Protocole alimentation

- Débuter EN dès stabilisation
- Minimal enteral feeding, augmentation progressive selon tolérance
- AM ou diète habituelle, enrichissement dans un second temps
- Complément par nutrition parentérale plus tardif, ligne de pression
- Cible: apport nutritionnel recommandé pour l'enfant sain

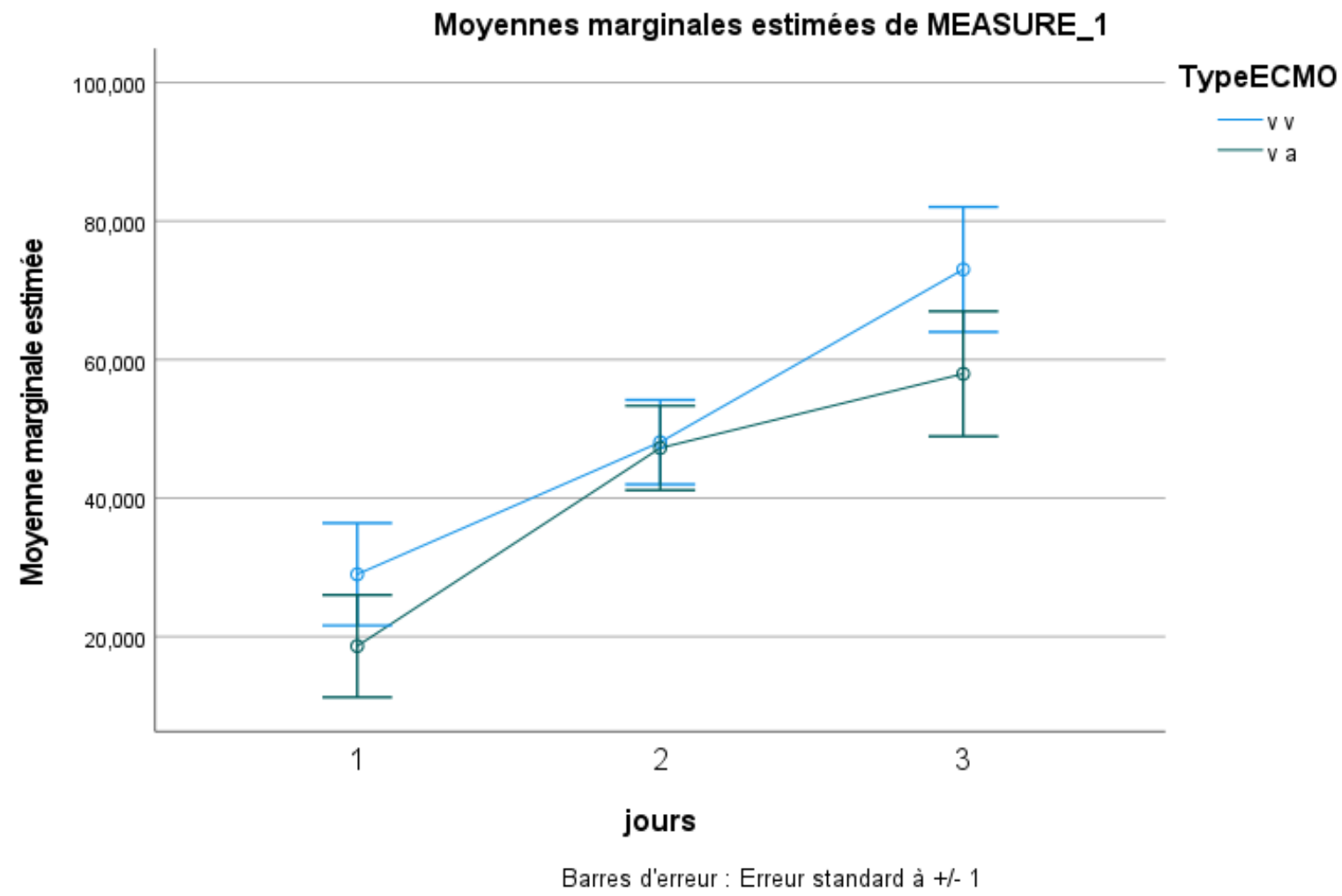


Types de patients

Table 1. Profile of children on ECMO

Variable	VV-ECMO	VA-ECMO	p-value
	78/127 (61.4%)	49/127 (38.6%)	
Age (mean $\pm$ SEM), months	17.1 $\pm$ 3.95	29.4 $\pm$ 7.72	0.160
Female sex n/total (%)	35/78 (44.9%)	16/49 (32.7%)	0.196
Weight for age z score (mean $\pm$ SEM)	-0.26 $\pm$ 0.21 (n=72)	-0.47 $\pm$ 0.21 (n=39)	0.533
Height for age z score (mean $\pm$ SEM)	-0.70 $\pm$ 0.68 (n=8)	-0.83 $\pm$ 1.12 (n=6)	0.919
Reason for ECMO			<0.001
Severe dysrhythmia (%)	0	3/49 (6.1%)	
Hypoxic cardiac arrest (%)	0	2/49 (4.1%)	
Severe cardiac failure pre cardiac(%) congenital heart surgery (%)	0	1/49 (2.0%)	
Low cardiac output after congenital heart surgery (%)	0	18/49 (36.7%)	
Heart failure due to hypothermia and malnutrition (%)	0	1/49 (2.0%)	
Septic shock (%)	0	7/49 (14.3%)	
Cardiomyopathy (%)	0	6/49 (12.2%)	
ARDS (%)	61/78 (78.2%)	4/49 (8.2%)	
Meconium inhalation (%)	11/78 (14.1%)	3/49 (6.1%)	
PAH (%)	3/78 (3.8%)	3/49 (6.1%)	
Asthma (%)	1/78 (1.3%)	0	
Foreign body inhalation (%)	1/78 (1.3%)	0	
Tracheal stenosis (%)	1/78 (1.3%)	0	
ECMO duration (mean $\pm$ SEM), days	6.9 $\pm$ 6.3 (n=78)	8.4 $\pm$ 7.4 (n=49)	0.233
PIM, (mean $\pm$ SEM) at admission PICU	13 $\pm$ 2(n=78)	23 $\pm$ 3(n=49)	0.019
PRISM (mean $\pm$ SEM) at admission PICU	22 $\pm$ 1(n=78)	27 $\pm$ 2(n=49)	0.014
Mortality	10/78 (12.8%)	22/49 (44.9%)	< 0.001

Evolution de l'apport calorique entérale



1: J2

2: J5

3: J10

Complications digestives

Table 3. Gastrointestinal complications in the VV-ECMO and VA-ECMO groups on Days 2, 5, and 10 (n=127)

Variables	VV-ECMO	VA-ECMO	p-value
Day 2			
Total of patients	78	49	–
Vomiting n/total (%)	0 (0%)	0 (0%)	–
Diarrhoea n/total (%)	10/73 (13.7%)	0 (0%)	0.013
GIH n/total (%)	3/78 (3.8%)	3/49 (6.1%)	0.675
Abdominal distension n/total (%)	1/77 (1.3%)	1/49 (2.1%)	1.000
Day 5			
Total of patients	50	34	–
Vomiting n/total (%)	1/49 (2.0%)	1/34 (2.9%)	1.000
Diarrhoea n/total (%)	7/49 (14.3%)	2/33 (6.1%)	0.302
GIH n/total (%)	1/50 (2.0%)	3/34 (8.8%)	0.298
Abdominal distension n/total (%)	2/50 (4.0%)	0/34 (0%)	0.512
Day 10			
Total of patients	11	11	–
Vomiting n/total (%)	0 (0%)	0 (0%)	–
Diarrhoea n/total (%)	0 (0%)	0 (0%)	–
GIH n/total (%)	0 (0%)	0 (0%)	–
Abdominal distension n/total (%)	1/11 (9.1%)	0 (0%)	1.000
NEC* n/total (%)	4/78 (5.1%)	5/49 (10.2%)	0.230

Abbreviations: VV-ECMO: venous extracorporeal membrane oxygenation; VA-ECMO: veno-arterial extracorporeal membrane oxygenation; GIH: gastrointestinal haemorrhage; NEC: necrotizing enterocolitis

Notes: NEC*: (VA + VV) = 9/127 (7.1%)

Facteurs de risque: intolérance digestive

Table 4. Risk factors of digestive complications on D2

	GI complications D2 (Total Patients 17)	No GI complications D2 (Total Patients 104)	p-value
PIM (mean ± SEM)	(12 ±4.84)	(18±2.24)	0.288
PRISM (mean ± SEM)	(19 ±2.90)	(25±1.12)	0.033
Lactate D0 mmol/l n/total (mean ± SEM)	17/17 (3.61±0.56)	104/104 (5.42±0.44)	0.015
Lactate D2 mmol/l n/total (mean ± SEM)	17/104 (1.96±0.22)	104/104 (2.21±0.12)	0.439
VV-ECMO n/total	13/73 (17.8%)	60/74 (81.2%)	0.185
VA-ECMO n/total	4/48 (8.3%)	44/48 (91.7%)	
Start EN hour n/total (mean ± SEM)	17/17 (22.1±12.0)	102/104 (36.6±5.0)	0.559
	GI complications D5 (Total Patients 17)	No GI complications D5 (Total Patients 65)	p-value
PIM(mean ± SEM)	(9±2.2)	(15±2.7)	0.114
PRISM(mean ± SEM)	(21±2.0)	(24±1.5)	0.246
Lactate D0 mmol/l n/total (mean ± SEM)	17/17 (3.76±0.69)	65/65 (5.17±0.53)	0.208
Lactate D2 mmol/l n/total (mean ± SEM)	17/17 (2.3±0.41)	65/65 (2.44±0.15)	0.704
Lactate D5 mmol/l n/total (mean ± SEM)	16/17 (1.95±0.25)	64/65 (2.31±0.38)	0.640
VV-ECMO n/total	11/49(22.4%)	38/48(77.6%)	0.783
VA-ECMO n/total	6/33(18.2%)	27/33(81.8%)	
Start EN hour n/total (mean ± SEM)	16/17 (16.1±5.76)	64/65 (39.3±7.92)	0.160

Abbreviations: GI: gastrointestinal; n: number of patients; PIM: pediatric index of mortality; PRISM: pediatric risk of mortality; VV-ECMO: venous extracorporeal membrane oxygenation; VA-ECMO: veno-arterial extracorporeal membrane oxygenation; EN: enteral nutrition; NEC: necrotizing enterocolitis. The p value for VV and VA ECMO is the p value of the prevalence of GI complications between VA and VV group.

Facteurs de risque: entérocolite nécrosante

Table 5. Relationship between risk factors and diagnosis of NEC

	Occurrence NEC (Total Patients 9)	No occurrence NEC (Total Patients 118)	p- value
PIM (mean ± SEM)	(13±4.74)	(17±2.12)	0.640
PRISM (mean ± SEM)	(24±1.08)	(28±3.22)	0.337
Lactate D0 n/total (mean ± SEM)	9/9 (6.30±1.53)	118/118 (5.07±0.38)	0.404
Lactate D2 n/total (mean ± SEM)	9/9 (3.16±0.72)	118/118(2.08±0.10)	0.089
Lactate D5 n/total (mean ± SEM)	8/9 (2.09±0.41)	74/118 (2.23±0.33)	0.444
Lactate D10 n/total (mean ± SEM)	2/9 (1.49±0.49)	20/118 (2.02±0.20)	0.220
VV-ECMO n/total (%)	4/9 (44.4%)	74/118 (62.7%)	
VA-ECMO n/total (%)	5/9 (55.6%)	44/118 (37.3%)	
Comparison of prevalence: VV vs. VA	5.1%	10.2%	0.230
Start EN hour n/total (mean ± SEM)	8/9 (39.1±9.0)	117/118 (32.6±4.8)	0.732

Abbreviations: n: number of patients; PIM: pediatric index of mortality; PRISM: pediatric risk of mortality; VV-ECMO: venous extracorporeal membrane oxygenation; VA-ECMO: veno-arterial extracorporeal membrane oxygenation; EN: enteral nutrition; NEC: necrotizing enterocolitis. The p value for VV and VA ECMO is the p-value of the prevalence of GI complications between VA and VV group.



Et le reste

- Médicaments vaso actifs
- Ionogramme
- Glycémie
- Constipation
- Maladie sous jacente
- Médicaments analgo sédatifs

En conclusion

- Identifier les spécificités de votre patient
- Définir une cible
- Prescrire une alimentation de façon progressive / si possible entérale
- Suivre la tolérance
- Adapter votre prescription
- Travail d'équipe

