CHU Caen

UNICAEN
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Basse-Normandie

Outils de surveillance du futur en anesthésie réanimation

25e Journée bas normande de perfectionnement des infirmiers anesthésistes

Samedi 11 Octobre 2014

fischer-mo@chu-caen.fr

Liens d’intérêt

ConMed
Covidien
Edwards
Maquet
Masimo
Nihon Kohden
Pulsion

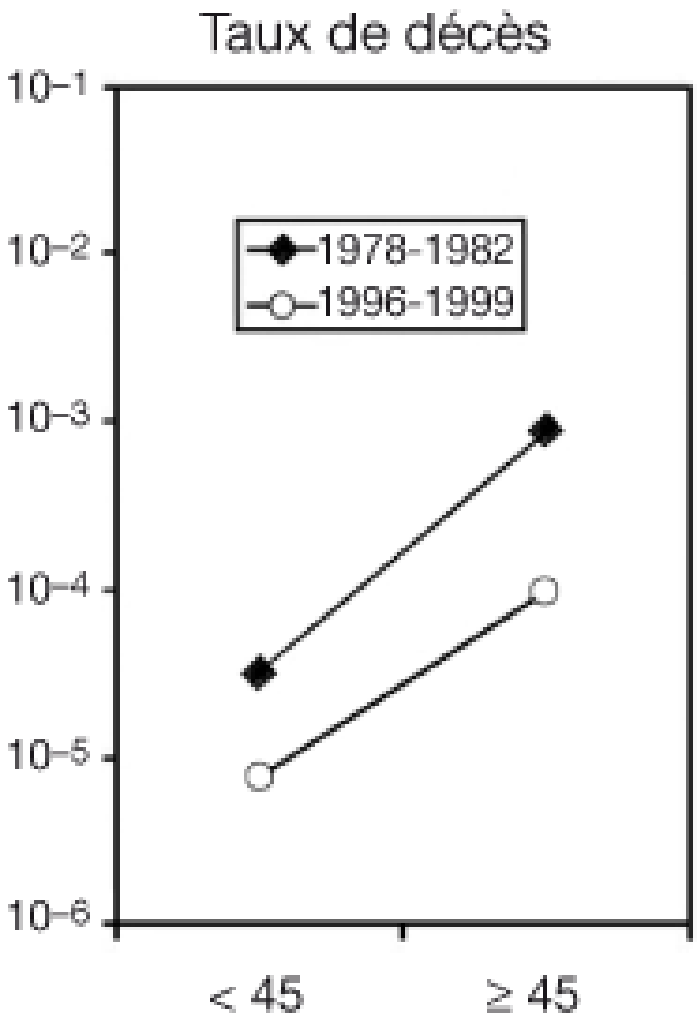
Liens d’intérêt

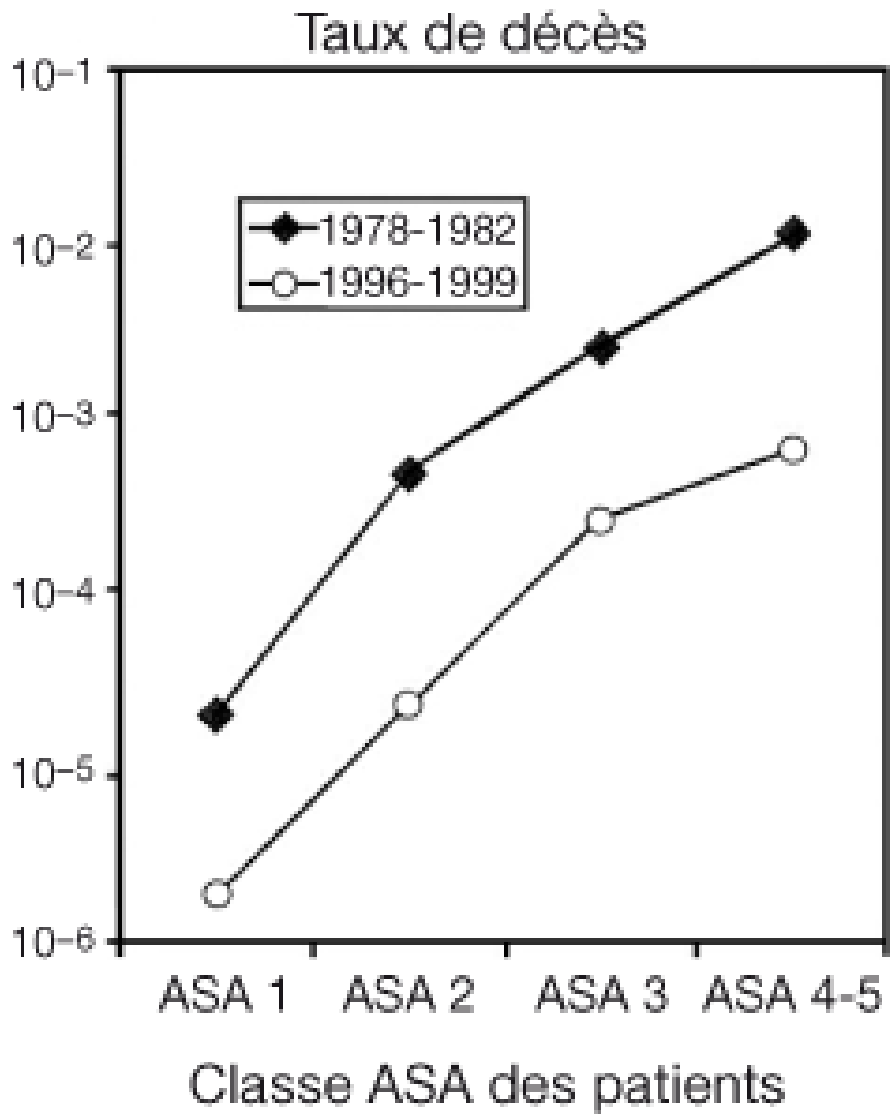
ConMed
Covidien
Edwards
Maquet
Masimo
Nihon Kohden
Pulsion

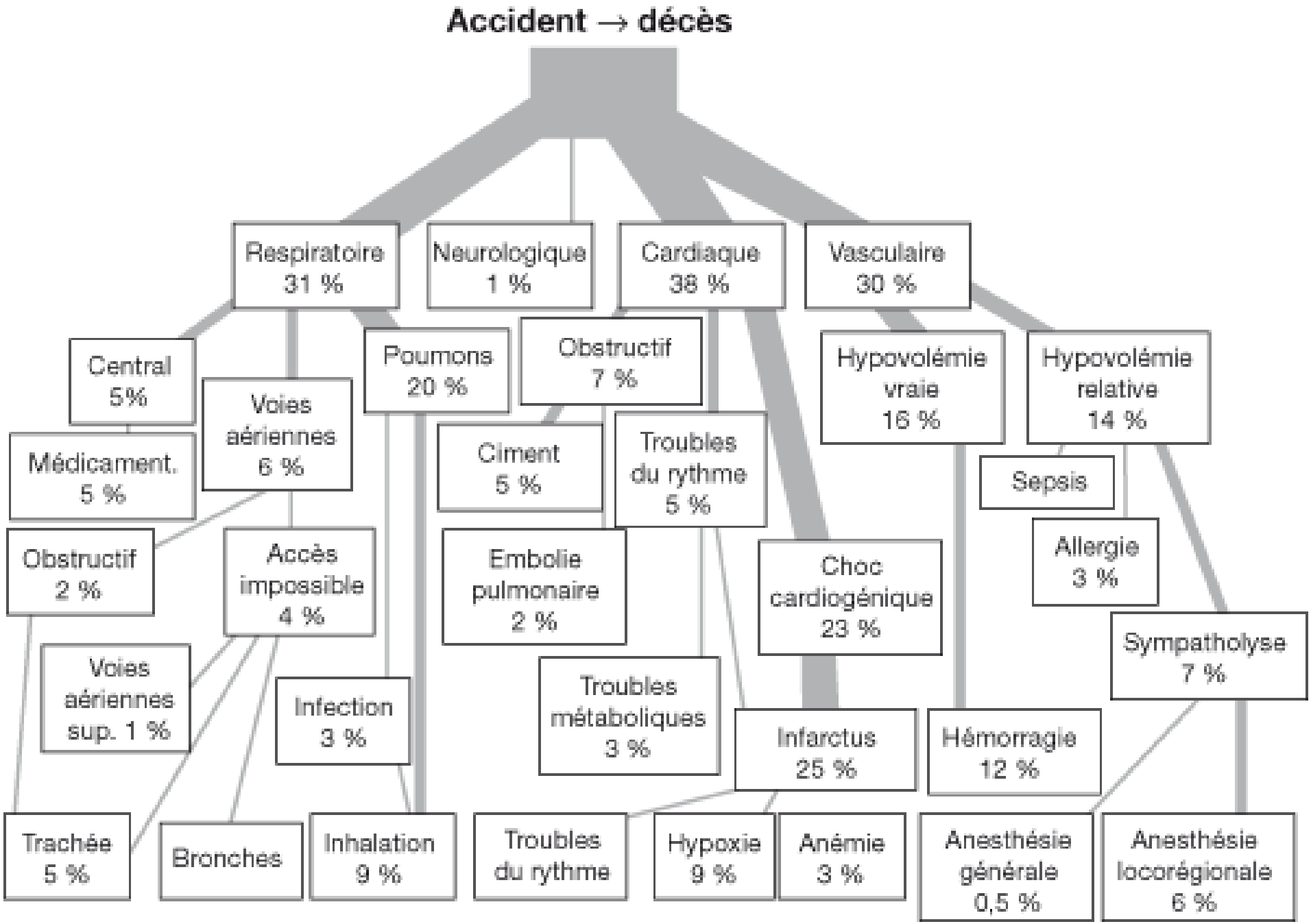
Conflits d’intérêt

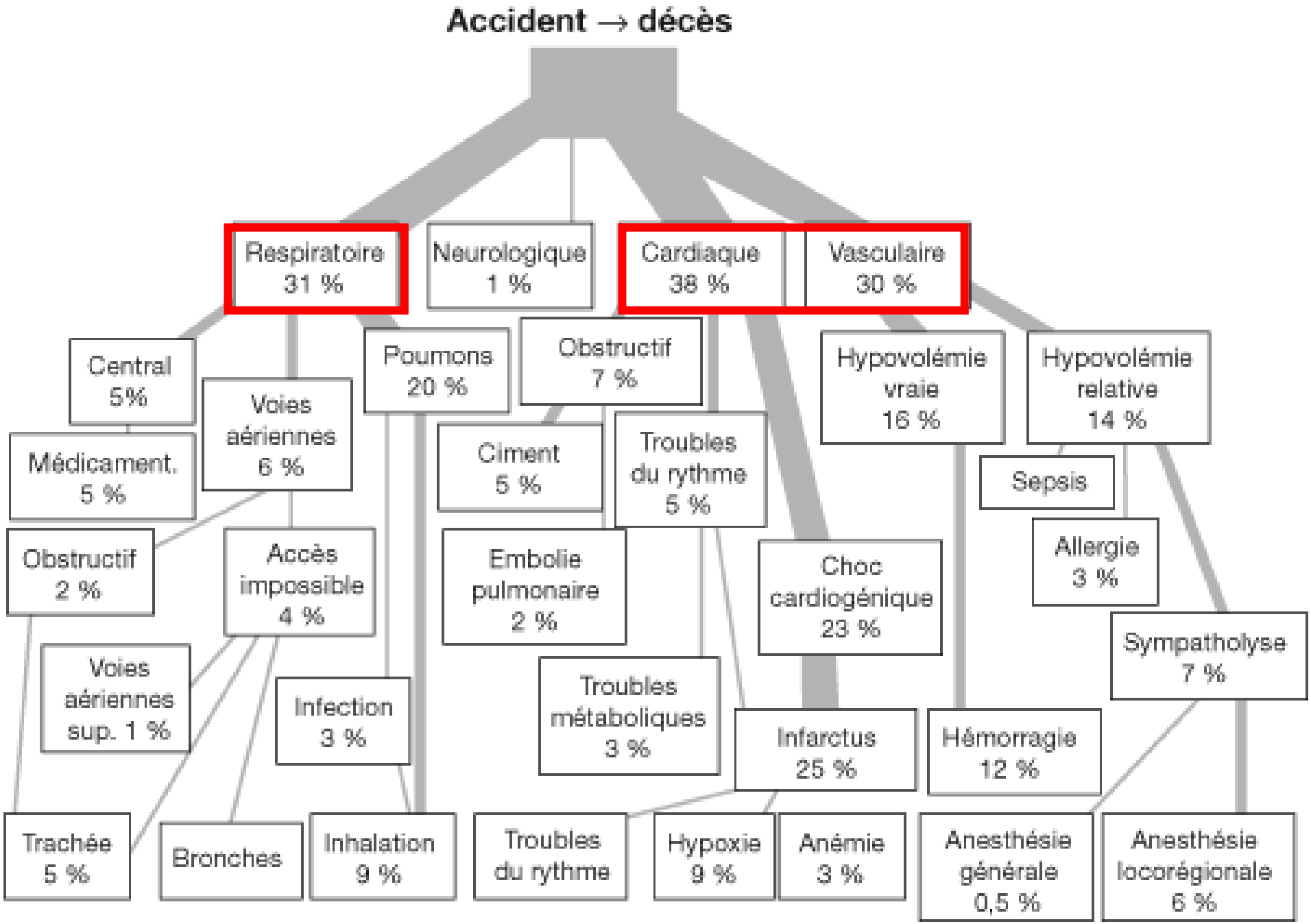
Aucun

Outils de surveillance du futur en anesthésie réanimation


Taux de décès
10−1
10−2
10−3
10−4
10−5
10−6
1978-1982
1996-1999
< 45
≥ 45
Âge des patients (ans)


Taux de décès
10−1
10−2
10−3
10−4
10−5
10−6
1978-1982
1996-1999
ASA 1
ASA 2
ASA 3
ASA 4-5
Classe ASA des patients


Accident → décès
Respiratoire 31 %
Neurologique 1 %
Cardiaque 38 %
Vasculaire 30 %
Central 5%
Médicament. 5 %
Obstructif 2 %
Voies aériennes sup. 1 %
Trachée 5 %
Voies aériennes 6 %
Accès impossible 4 %
Bronches
Poumons 20 %
Infection 3 %
Inhalation 9 %
Obstructif 7 %
Ciment 5 %
Embolie pulmonaire 2 %
Troubles du rythme 5 %
Troubles métaboliques 3 %
Troubles du rythme
Choc cardiogénique 23 %
Infarctus 25 %
Hypoxie 9 %
Anémie 3 %
Hypovolémie vraie 16 %
Hémorragie 12 %
Anesthésie générale 0,5 %
Hypovolémie relative 14 %
Sepsis
Allergie 3 %
Sympatholyse 7 %
Anesthésie locorégionale 6 %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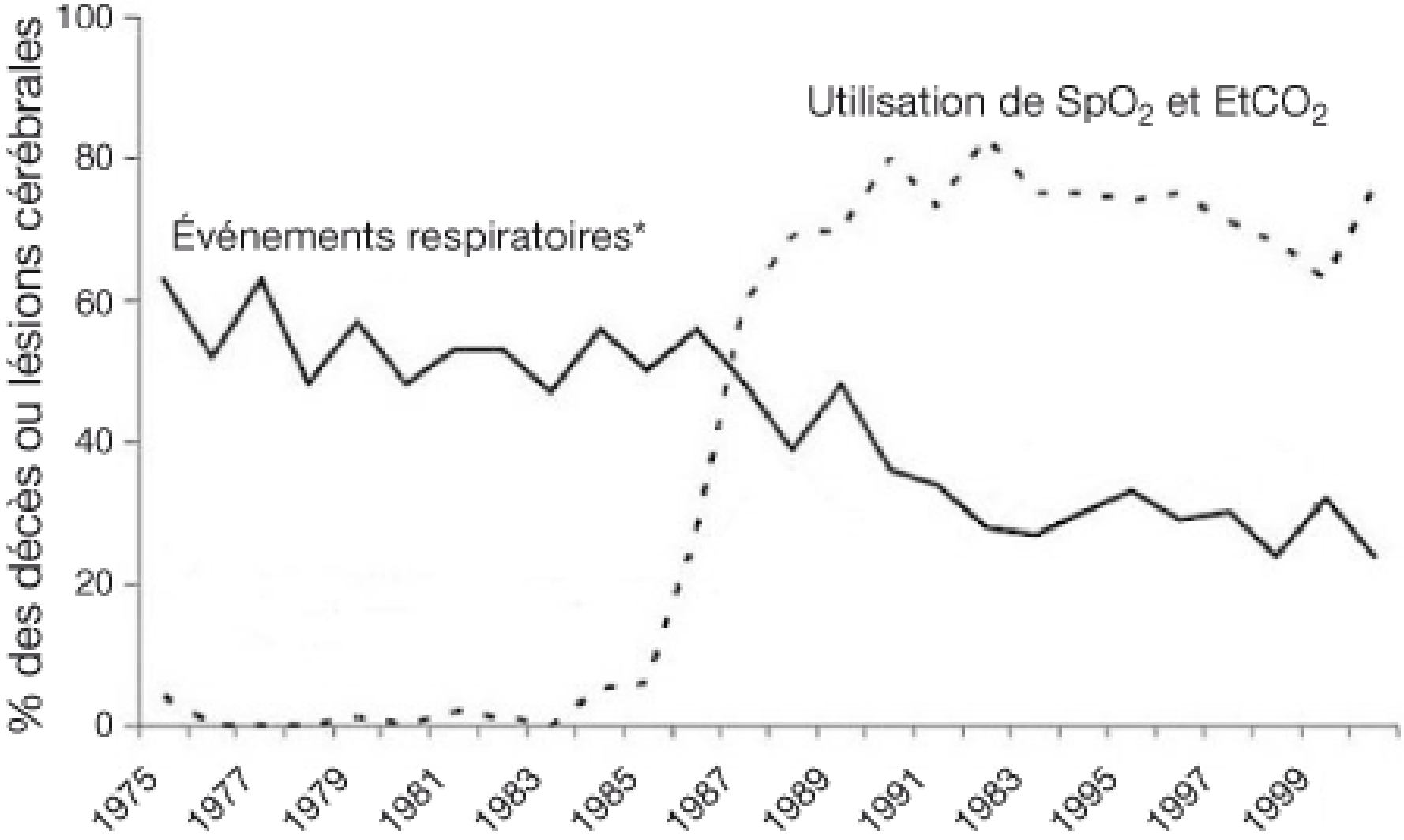

* $p < 0{,}01$ entre 1986 et 2000 (régression logistique)

World Health Organization | Patient Safety

A World Alliance for Safer Health Care

WHO Guidelines for Safe Surgery 2009

Safe Surgery Saves Lives

Surgical Safety Checklist

World Health Organization | Patient Safety
A World Alliance for Safer Health Care

Before induction of anaesthesia

(with at least nurse and anaesthetist)

Has the patient confirmed his/her identity, site, procedure, and consent?
- ☐ Yes

Is the site marked?
- ☐ Yes
- ☐ Not applicable

Is the anaesthesia machine and medication check complete?
- ☐ Yes

Is the pulse oximeter on the patient and functioning?
- ☐ Yes

Does the patient have a:

Known allergy?
- ☐ No
- ☐ Yes

Difficult airway or aspiration risk?
- ☐ No
- ☐ Yes, and equipment/assistance available

Risk of >500ml blood loss (7ml/kg in children)?
- ☐ No
- ☐ Yes, and two IVs/central access and fluids planned

Before skin incision

(with nurse, anaesthetist and surgeon)

- ☐ **Confirm all team members have introduced themselves by name and role.**
- ☐ **Confirm the patient's name, procedure, and where the incision will be made.**

Has antibiotic prophylaxis been given within the last 60 minutes?
- ☐ Yes
- ☐ Not applicable

Anticipated Critical Events

To Surgeon:
- ☐ What are the critical or non-routine steps?
- ☐ How long will the case take?
- ☐ What is the anticipated blood loss?

To Anaesthetist:
- ☐ Are there any patient-specific concerns?

To Nursing Team:
- ☐ Has sterility (including indicator results) been confirmed?
- ☐ Are there equipment issues or any concerns?

Is essential imaging displayed?
- ☐ Yes
- ☐ Not applicable

Before patient leaves operating room

(with nurse, anaesthetist and surgeon)

Nurse Verbally Confirms:
- ☐ The name of the procedure
- ☐ Completion of instrument, sponge and needle counts
- ☐ Specimen labelling (read specimen labels aloud, including patient name)
- ☐ Whether there are any equipment problems to be addressed

To Surgeon, Anaesthetist and Nurse:
- ☐ What are the key concerns for recovery and management of this patient?

This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.

Revised 1 / 2009

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The NEW ENGLAND JOURNAL of MEDICINE

SPECIAL ARTICLE

A Surgical Safety Checklist to Reduce Morbidity and Mortality in a Global Population

Alex B. Haynes, M.D., M.P.H., Thomas G. Weiser, M.D., M.P.H., William R. Berry, M.D., M.P.H., Stuart R. Lipsitz, Sc.D., Abdel-Hadi S. Breizat, M.D., Ph.D., E. Patchen Dellinger, M.D., Teodoro Herbosa, M.D., Sudhir Joseph, M.S., Pascience L. Kibatala, M.D., Marie Carmela M. Lapitan, M.D., Alan F. Merry, M.B., Ch.B., F.A.N.Z.C.A., F.R.C.A., Krishna Moorthy, M.D., F.R.C.S., Richard K. Reznick, M.D., M.Ed., Bryce Taylor, M.D., and Atul A. Gawande, M.D., M.P.H., for the Safe Surgery Saves Lives Study Group*

N Engl J Med 2009;360:491-9.

Table 1. Elements of the Surgical Safety Checklist.*

Sign in

Before induction of anesthesia, members of the team (at least the nurse and an anesthesia professional) orally confirm that:

- The patient has verified his or her identity, the surgical site and procedure, and consent
- The surgical site is marked or site marking is not applicable
- The pulse oximeter is on the patient and functioning
- All members of the team are aware of whether the patient has a known allergy
- The patient's airway and risk of aspiration have been evaluated and appropriate equipment and assistance are available
- If there is a risk of blood loss of at least 500 ml (or 7 ml/kg of body weight, in children), appropriate access and fluids are available

Time out

Before skin incision, the entire team (nurses, surgeons, anesthesia professionals, and any others participating in the care of the patient) orally:

- Confirms that all team members have been introduced by name and role
- Confirms the patient's identity, surgical site, and procedure
- Reviews the anticipated critical events
  - Surgeon reviews critical and unexpected steps, operative duration, and anticipated blood loss
  - Anesthesia staff review concerns specific to the patient
  - Nursing staff review confirmation of sterility, equipment availability, and other concerns
- Confirms that prophylactic antibiotics have been administered ≤60 min before incision is made or that antibiotics are not indicated
- Confirms that all essential imaging results for the correct patient are displayed in the operating room

Sign out

Before the patient leaves the operating room:

- Nurse reviews items aloud with the team
  - Name of the procedure as recorded
  - That the needle, sponge, and instrument counts are complete (or not applicable)
  - That the specimen (if any) is correctly labeled, including with the patient's name
  - Whether there are any issues with equipment to be addressed
- The surgeon, nurse, and anesthesia professional review aloud the key concerns for the recovery and care of the patient

Table 2. Characteristics of Participating Hospitals.

Site	Location	No. of Beds	No. of Operating Rooms	Type
Prince Hamzah Hospital	Amman, Jordan	500	13	Public, urban
St. Stephen's Hospital	New Delhi, India	733	15	Charity, urban
University of Washington Medical Center	Seattle, Washington	410	24	Public, urban
St. Francis Designated District Hospital	Ifakara, Tanzania	371	3	District, rural
Philippine General Hospital	Manila, Philippines	1800	39	Public, urban
Toronto General Hospital	Toronto, Canada	744	19	Public, urban
St. Mary's Hospital*	London, England	541	16	Public, urban
Auckland City Hospital	Auckland, New Zealand	710	31	Public, urban

Table 3. Surgical Safety Policies in Place at Participating Hospitals before the Study.

Site No.*	Routine Intraoperative Monitoring with Pulse Oximetry	Oral Confirmation of Patient's Identity and Surgical Site in Operating Room	Routine Administration of Prophylactic Antibiotics in Operating Room	Standard Plan for Intravenous Access for Cases of High Blood Loss	Formal Team Briefing	
					Preoperative	Postoperative
1	Yes	Yes	Yes	No	No	No
2	Yes	No	Yes	No	No	No
3	Yes	No	Yes	No	No	No
4	Yes	Yes	Yes	No	No	No
5	No	No	No	No	No	No
6	No	No	Yes	No	No	No
7	Yes	No	No	No	No	No
8	Yes	No	No	No	No	No

Table 6. Selected Process Measures before and after Checklist Implementation, According to Site.*

Site No.	No. of Patients Enrolled		Objective Airway Evaluation Performed (N=7688)		Pulse Oximeter Used (N=7688)		Two Peripheral or One Central IV Catheter Present at Incision When EBL ≥500 ml (N=953)		Prophylactic Antibiotics Given Appropriately (N=6802)	
	Before	After	Before	After	Before	After	Before	After	Before	After
									percent	
1	524	598	97.0	98.5	100.0	100.0	95.7	83.6	98.1	96.9
2	357	351	72.0	75.8	97.5	98.6	78.8	61.3	56.9	76.9
3	497	486	74.7	66.3	98.6	100.0	83.8	82.5	83.8	87.7
4	520	545	94.6	95.8	100.0	100.0	66.7	48.6	80.0	81.8
5	370	330	6.2	0.0	68.9	91.2	7.6	2.7	29.8	96.2
6	496	476	46.2	56.3	76.4	83.0	49.2	57.9	25.4	50.6
7	525	585	97.5	99.7	99.4	100.0	32.0	100.0	42.5	91.7
8	444	584	0.5	94.0	99.3	99.5	68.8	57.1	18.2	77.6
Total	3733	3955	64.0	77.2	93.6	96.8	58.1	63.2	56.1	82.6
P value			<0.001		<0.001		0.32		<0.001	

Table 5. Outcomes before and after Checklist Implementation, According to Site.*

Site No.	No. of Patients Enrolled		Surgical-Site Infection		Unplanned Return to the Operating Room		Pneumonia		Death		Any Complication	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
							percent					
1	524	598	**4.0**	**2.0**	**4.6**	**1.8**	0.8	1.2	**1.0**	**0.0**	**11.6**	**7.0**
2	357	351	2.0	1.7	0.6	1.1	3.6	3.7	1.1	0.3	7.8	6.3
3	497	486	5.8	4.3	4.6	2.7	1.6	1.7	0.8	1.4	13.5	9.7
4	520	545	3.1	2.6	2.5	2.2	0.6	0.9	1.0	0.6	7.5	5.5
5	370	330	**20.5**	**3.6**	1.4	1.8	0.3	0.0	**1.4**	**0.0**	**21.4**	**5.5**
6	496	476	4.0	4.0	3.0	3.2	2.0	1.9	3.6	1.7	10.1	9.7
7	525	585	**9.5**	**5.8**	**1.3**	**0.2**	1.0	1.7	2.1	1.7	**12.4**	**8.0**
8	444	584	4.1	2.4	0.5	1.2	0.0	0.0	1.4	0.3	6.1	3.6
Total	3733	3955	**6.2**	**3.4**	**2.4**	**1.8**	1.1	1.3	**1.5**	**0.8**	**11.0**	**7.0**
P value			<0.001		0.047		0.46		0.003		<0.001	

high-income or low-income sites exclusively. The reduction in the rates of death and complications suggests that the checklist program can improve the safety of surgical patients in diverse clinical and economic environments.

Fréquence respiratoire acoustique

RRa

La fréquence respiratoire acoustique (RRa™) est une mesure révolutionnaire qui permet aux cliniciens de surveiller de manière non invasive et continue la respiration des patients, ce qui facilite le diagnostic précoce et le traitement des insuffisances et détresses respiratoires.

Précision > Facilité d'utilisation > Bonne tolérance chez les patients

MODE DE FONCTIONNEMENT

La technologie rainbow Acoustic Monitoring™ permet de mesurer de façon non invasive et continue la fréquence respiratoire grâce à un capteur adhésif innovant doté d'une sonde acoustique intégrée qui se place facilement et confortablement sur le cou du patient.

Le traitement du signal acoustique intégré à la technologie brevetée révolutionnaire d'extraction de signal de Masimo (Signal Extraction Technology - SET®) permet de séparer et de traiter le signal respiratoire afin d'afficher la fréquence respiratoire en continu.

Capteur acoustique en tissu rainbow Acoustic Sensor™
Le tissu respirant favorise la pénétration d'air dans la bande pour un confort accru du patient

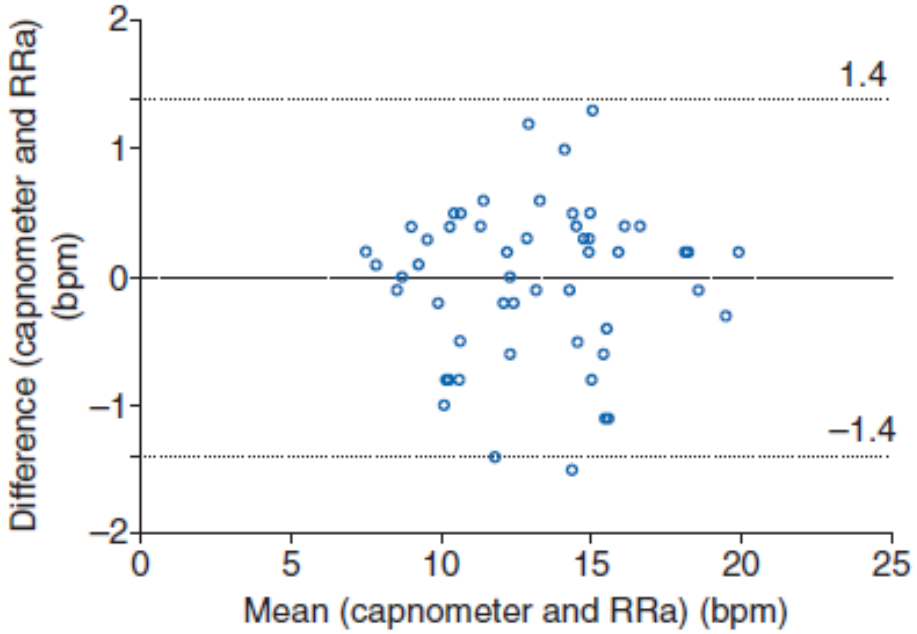
Signal acoustique

British Journal of Anaesthesia **108** (5): 872–5 (2012)
Advance Access publication 8 February 2012 · doi:10.1093/bja/aer510

BJA

Accuracy of respiratory rate monitoring using a non-invasive acoustic method after general anaesthesia

O. Mimoz[1,2,3*], T. Benard[1], A. Gaucher[1,3], D. Frasca[1,2,3] and B. Debaene[1,2,3]



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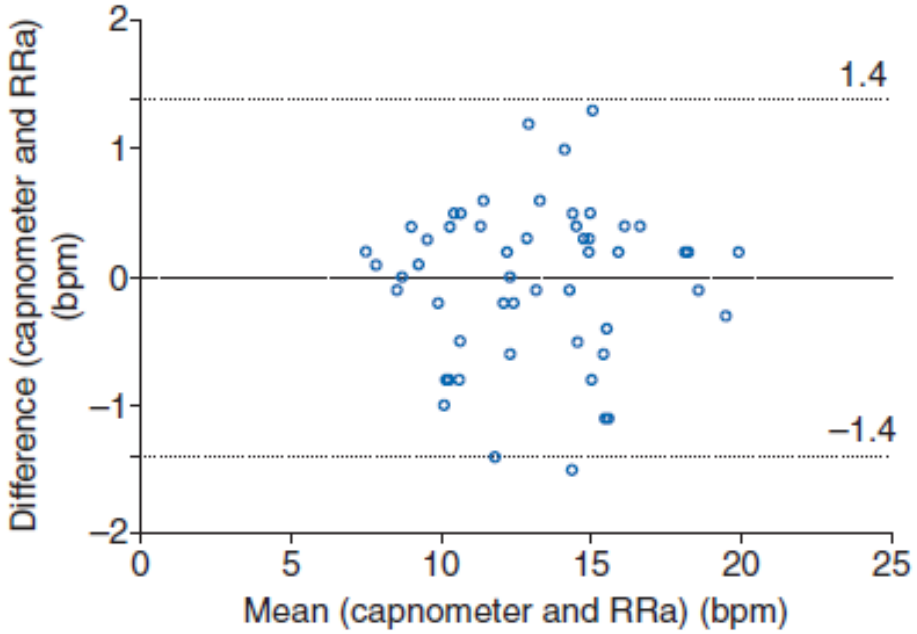
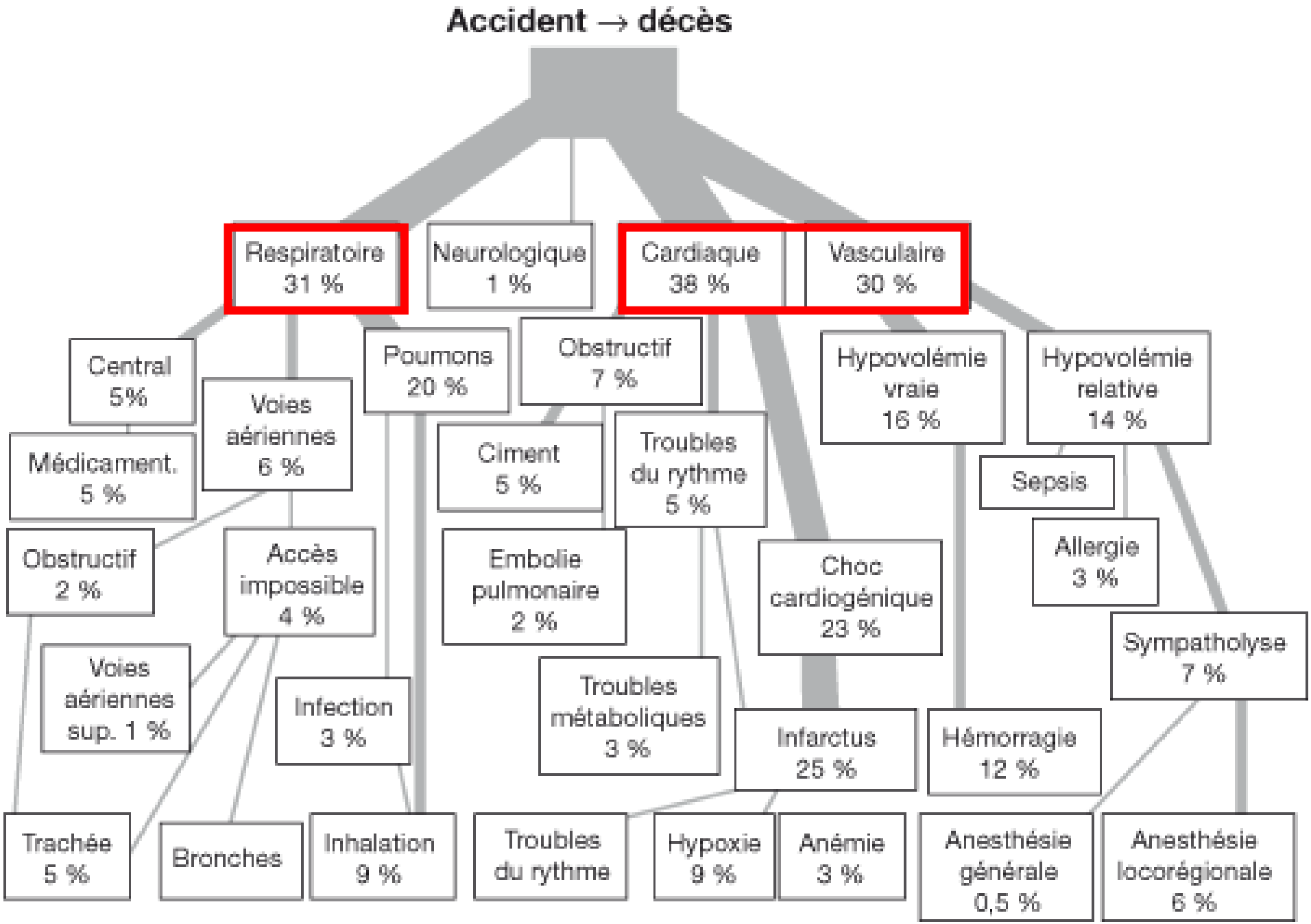


Declaration of interest

O.M., A.G., and D.F. received lecture fees and travel expenses from Masimo Corp.

Aucune étude d'impact et indépendante pour le RRa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RECOMMANDATIONS FORMALISÉES D'EXPERTS

SFAR
Société Française d'Anesthésie et de Réanimation

Stratégie du remplissage vasculaire périopératoire

Guidelines for perioperative haemodynamic optimization

Validation par le conseil d'administration de la Sfar du 19 octobre 2012.

En collaboration avec l'Adarpef

- Prédiction de la réponse au remplissage vasculaire (VPP, PVI)

- Titration du remplissage vasculaire (monitorage du VES)

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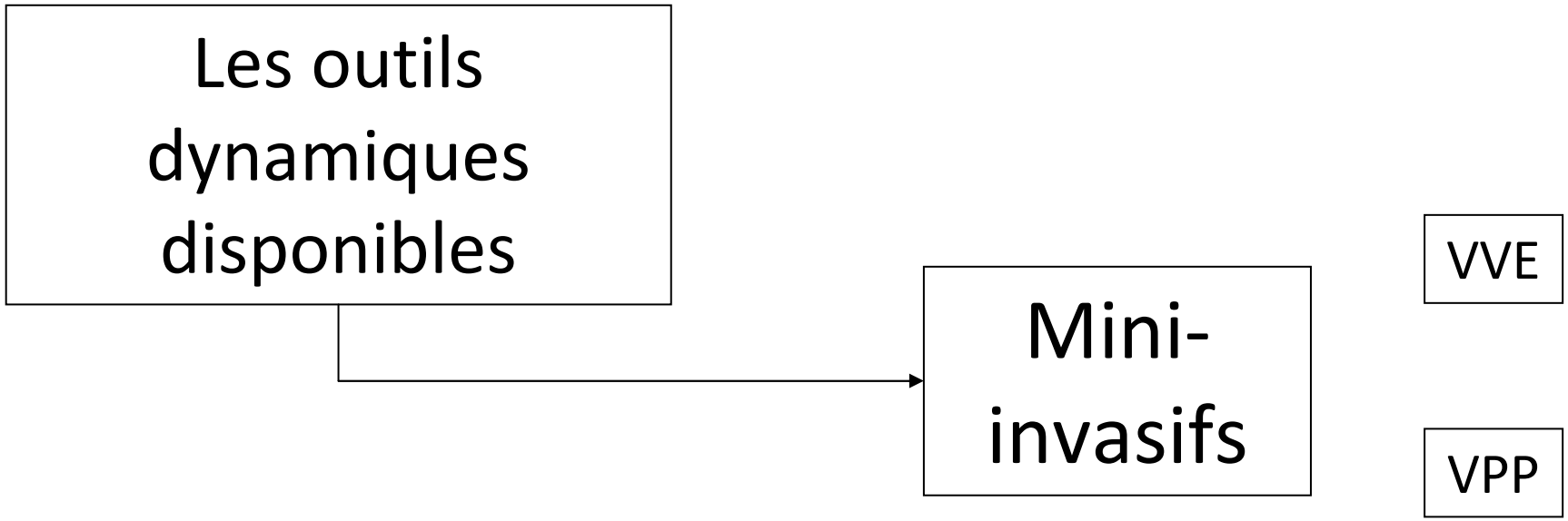
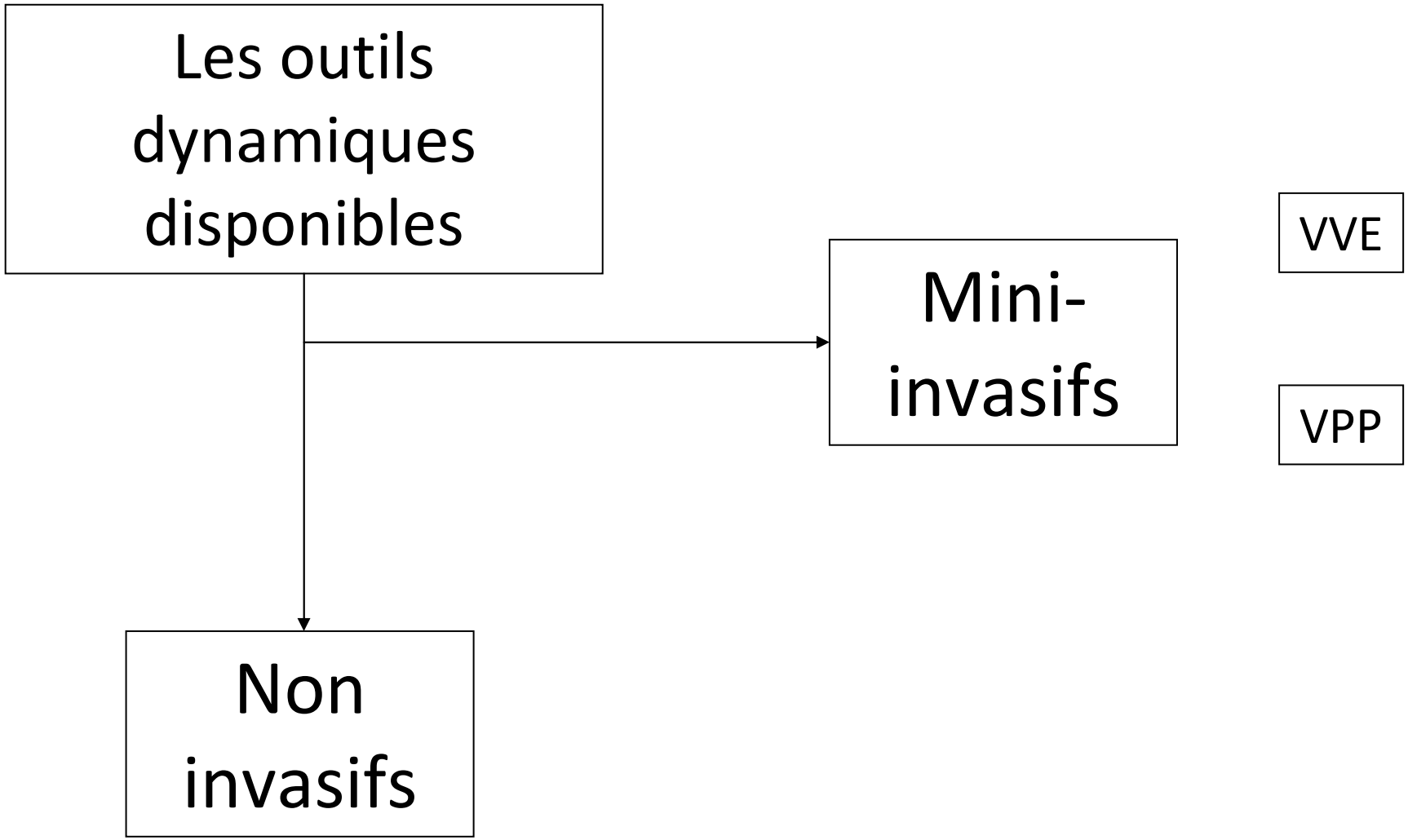
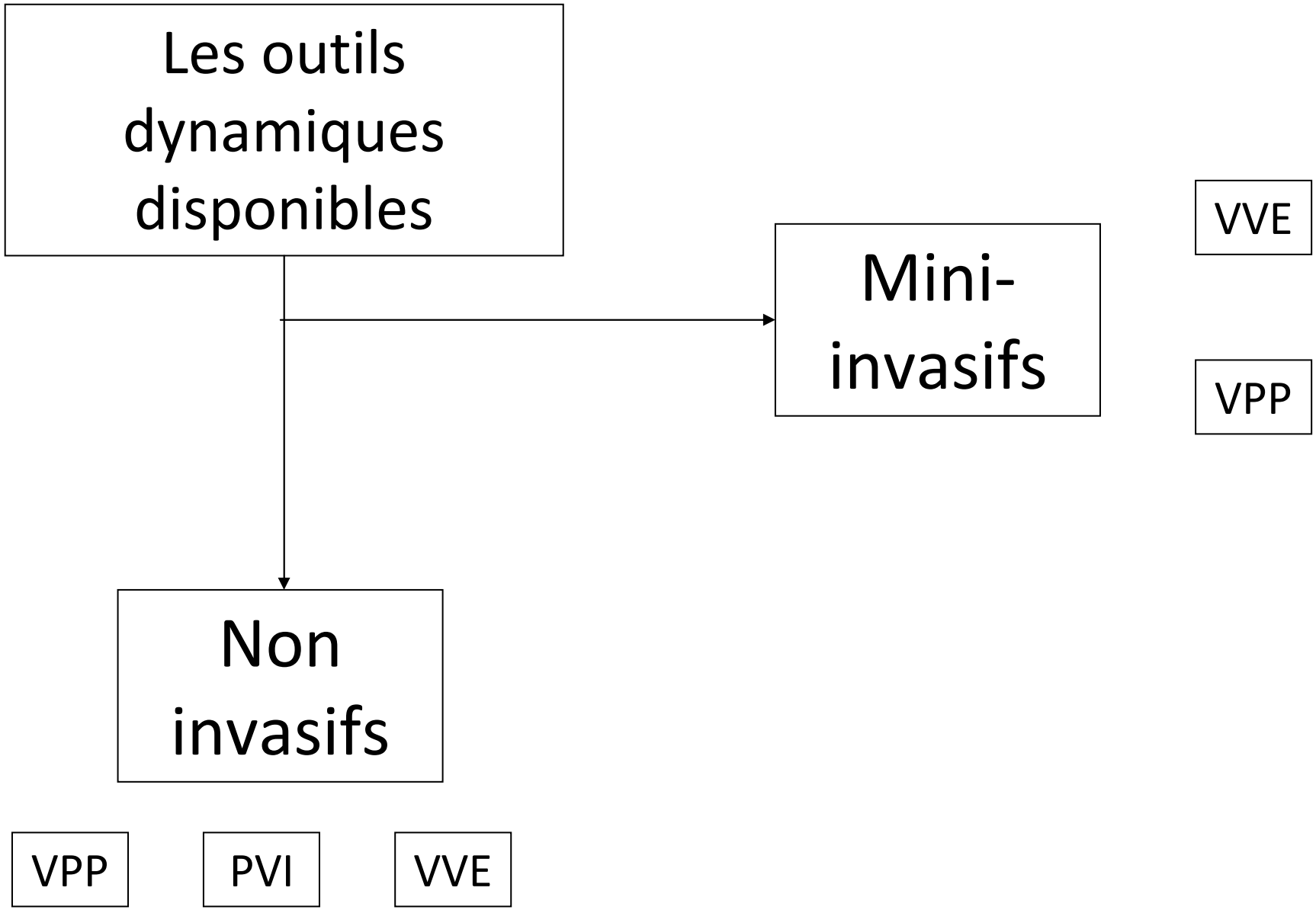
Les outils dynamiques disponibles
Mini-invasifs


Les outils dynamiques disponibles
Mini-invasifs
VVE
VPP


Les outils dynamiques disponibles
Mini-invasifs
VVE
VPP
Non invasifs


Les outils dynamiques disponibles
Mini-invasifs
VVE
VPP
Non invasifs
VPP
PVI
VVE

Aucune étude d'impact et indépendante pour les indices dynamiques

RECOMMANDATIONS FORMALISÉES D'EXPERTS

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Stratégie du remplissage vasculaire périopératoire

Guidelines for perioperative haemodynamic optimization

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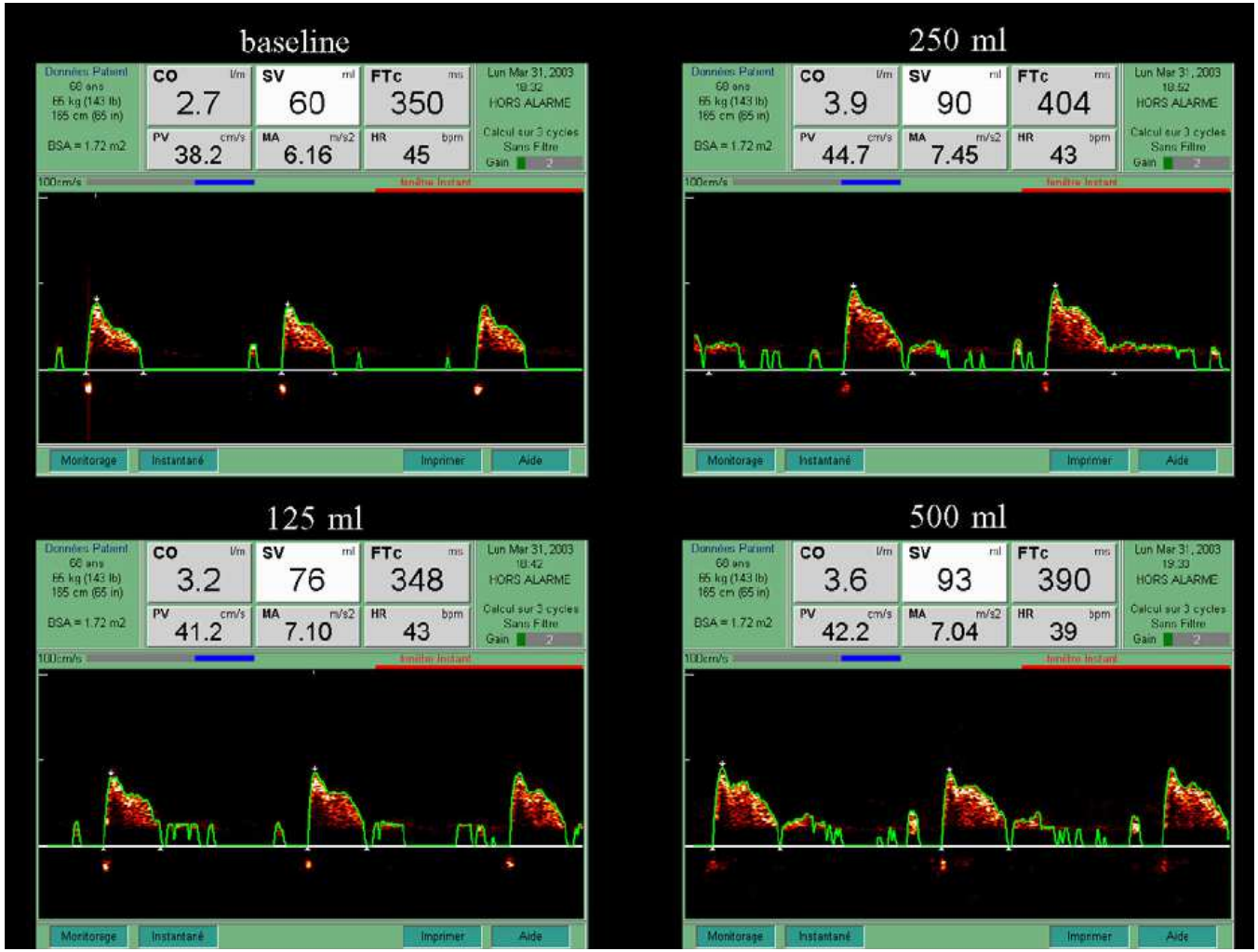
- Prédiction de la réponse au remplissage vasculaire (VPP, PVI)

- **Titration du remplissage vasculaire (monitorage du VES)**

Les nouvelles techniques de monitorage du débit cardiaque : gadgets ou avancées réelles ?

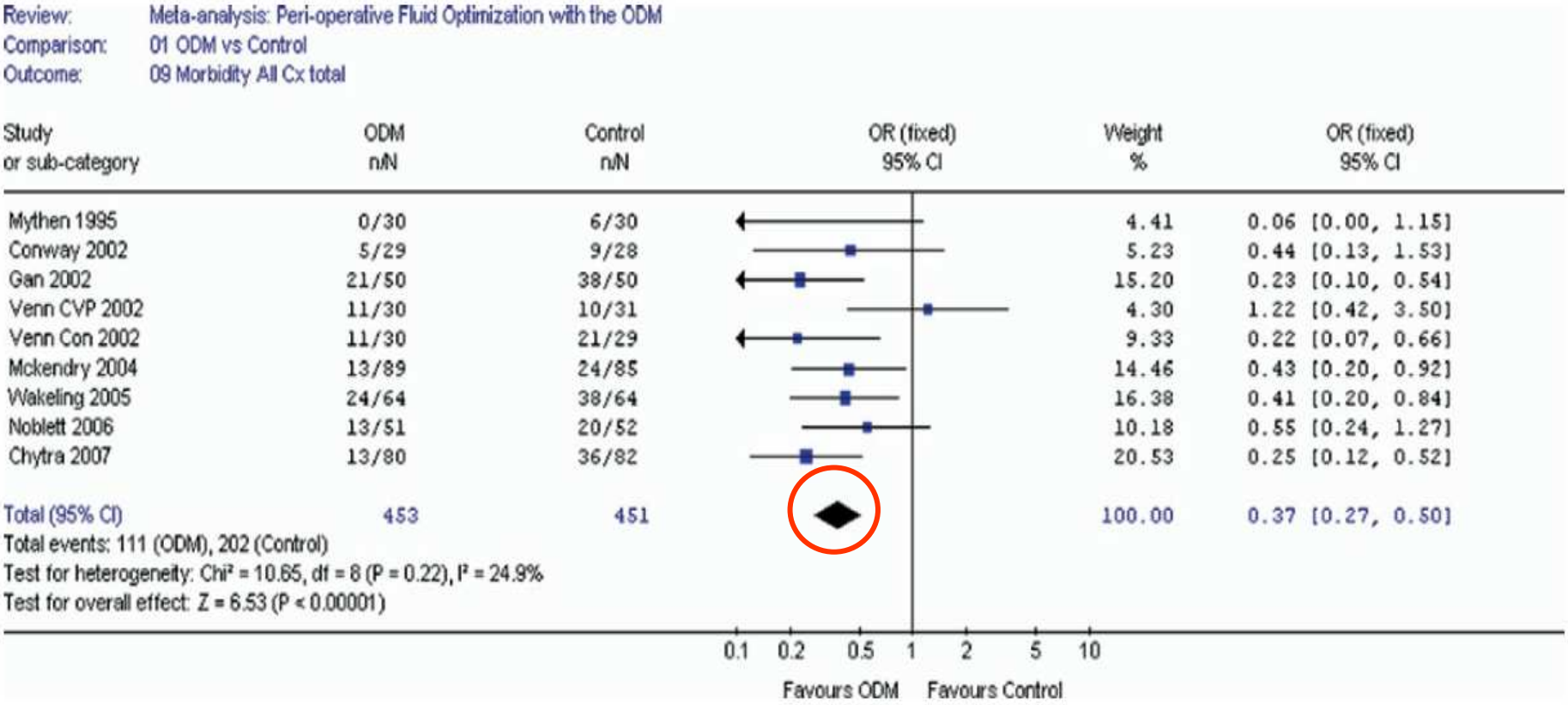
Chatti R. Reanimation 2007 ; 16 : 156-62



Improving Perioperative Outcomes: Fluid Optimization with the Esophageal Doppler Monitor, a Metaanalysis and Review

J Am Coll Surg 2008

Tuong D Phan, MBBS, FRCA, Hilmy Ismail, MD, FFARCS(I), FRCA FANZCA,
Alexander G Heriot, MD, FRCS, FRACS, Kwok M Ho, MPH, FANZCA, FJFICM



Morbidité postopératoire

Improving Perioperative Outcomes: Fluid Optimization with the Esophageal Doppler Monitor, a Metaanalysis and Review

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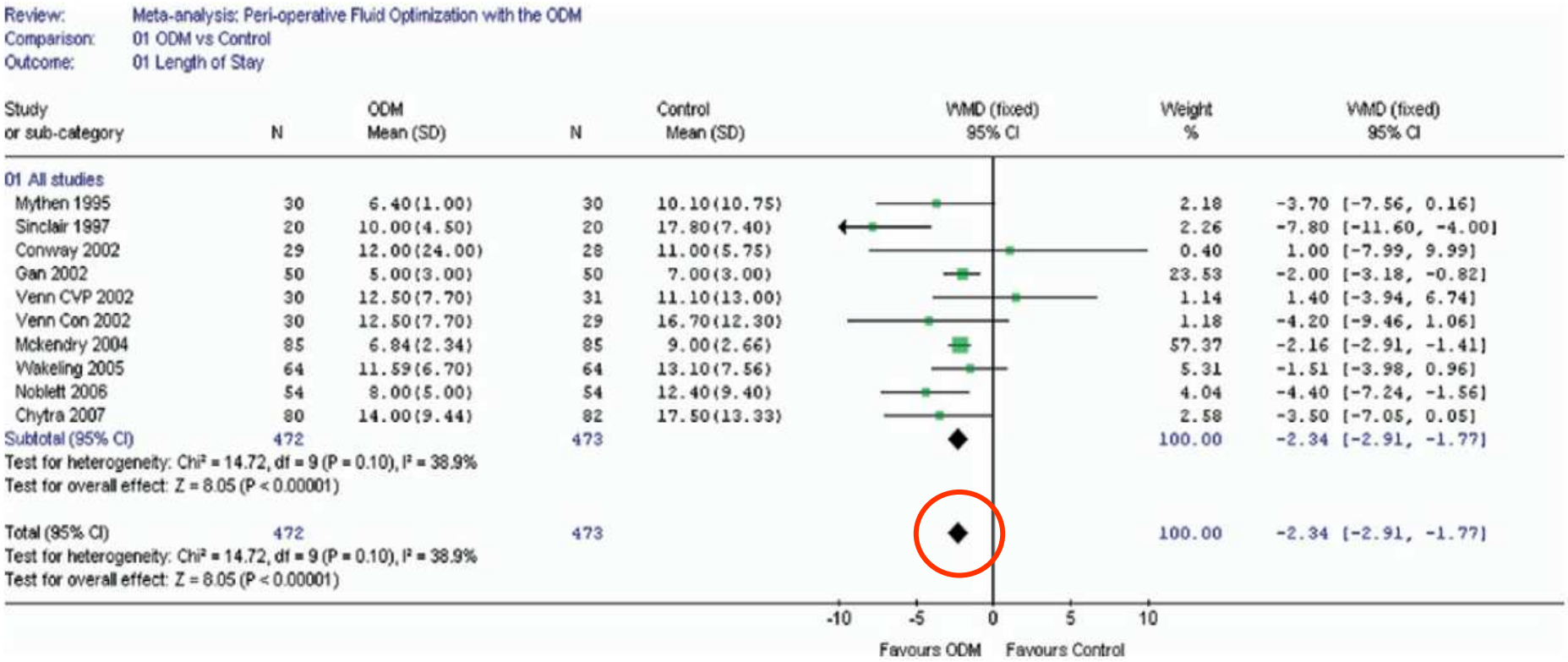


Durée d'hospitalisation

Aucune étude d'impact et indépendante pour les « nouveaux outils de monitorages non invasifs du débit cardiaque »

Mortality after surgery in Europe: a 7 day cohort study

*Rupert M Pearse, Rui P Moreno, Peter Bauer, Paolo Pelosi, Philipp Metnitz, Claudia Spies, Benoit Vallet, Jean-Louis Vincent, Andreas Hoeft, Andrew Rhodes, for the European Surgical Outcomes Study (EuSOS) group for the Trials groups of the European Society of Intensive Care Medicine and the European Society of Anaesthesiology**

Lancet 2012; 380: 1059–65

Methods We did this 7 day cohort study between April 4 and April 11, 2011. We collected data describing consecutive patients aged 16 years and older undergoing inpatient non-cardiac surgery in 498 hospitals across 28 European nations. Patients were followed up for a maximum of 60 days. The primary endpoint was in-hospital mortality. Secondary outcome measures were duration of hospital stay and admission to critical care. We used χ^2 and Fisher's exact tests to compare categorical variables and the *t* test or the Mann-Whitney *U* test to compare continuous variables. Significance was set at $p<0\cdot05$. We constructed multilevel logistic regression models to adjust for the differences in mortality rates between countries.

Findings We included 46 539 patients, of whom 1855 (4%) died before hospital discharge. 3599 (8%) patients were admitted to critical care after surgery with a median length of stay of 1·2 days (IQR 0·9–3·6). 1358 (73%) patients who died were not admitted to critical care at any stage after surgery. Crude mortality rates varied widely between countries (from 1·2% [95% CI 0·0–3·0] for Iceland to 21·5% [16·9–26·2] for Latvia). After adjustment for

Interpretation The mortality rate for patients undergoing inpatient non-cardiac surgery was higher than anticipated. Variations in mortality between countries suggest the need for national and international strategies to improve care for this group of patients.

Tableau IIIa

Proposition de classification du risque lié au type de chirurgie (d'après [1,2]).

Risque lié au type de chirurgie		
Faible	Modéré	Elevé
Chirurgie ambulatoire	Urologie (rénale) Intestinale simple Vasculaire périphérique	Modéré avec caractère d'urgence Vasculaire aortique Abdominale (Hépatique, pancréatique, gastrique, oesophagienne, intestinale compliquée) Orthopédie (reprise d'arthroplastie)

Tableau IIIb

Proposition de classification de risque lié au patient (d'après [1,2]).

Risque lié au patient	Faible	Absence de co-morbidité
	Modéré	Age > 65 ans Hospitalisation précédent la chirurgie > 3 jours Score ASA ≥ 3 Présence d'une comorbidité (cardiopathie ischémique ou décompensée, AVC, Diabète insulino-dépendant, cirrhose, BPCO, cancer métastasé)
	Elevé	Patient avec plusieurs comorbidités Patient avec plusieurs facteurs de risque modérés Patient en état de choc

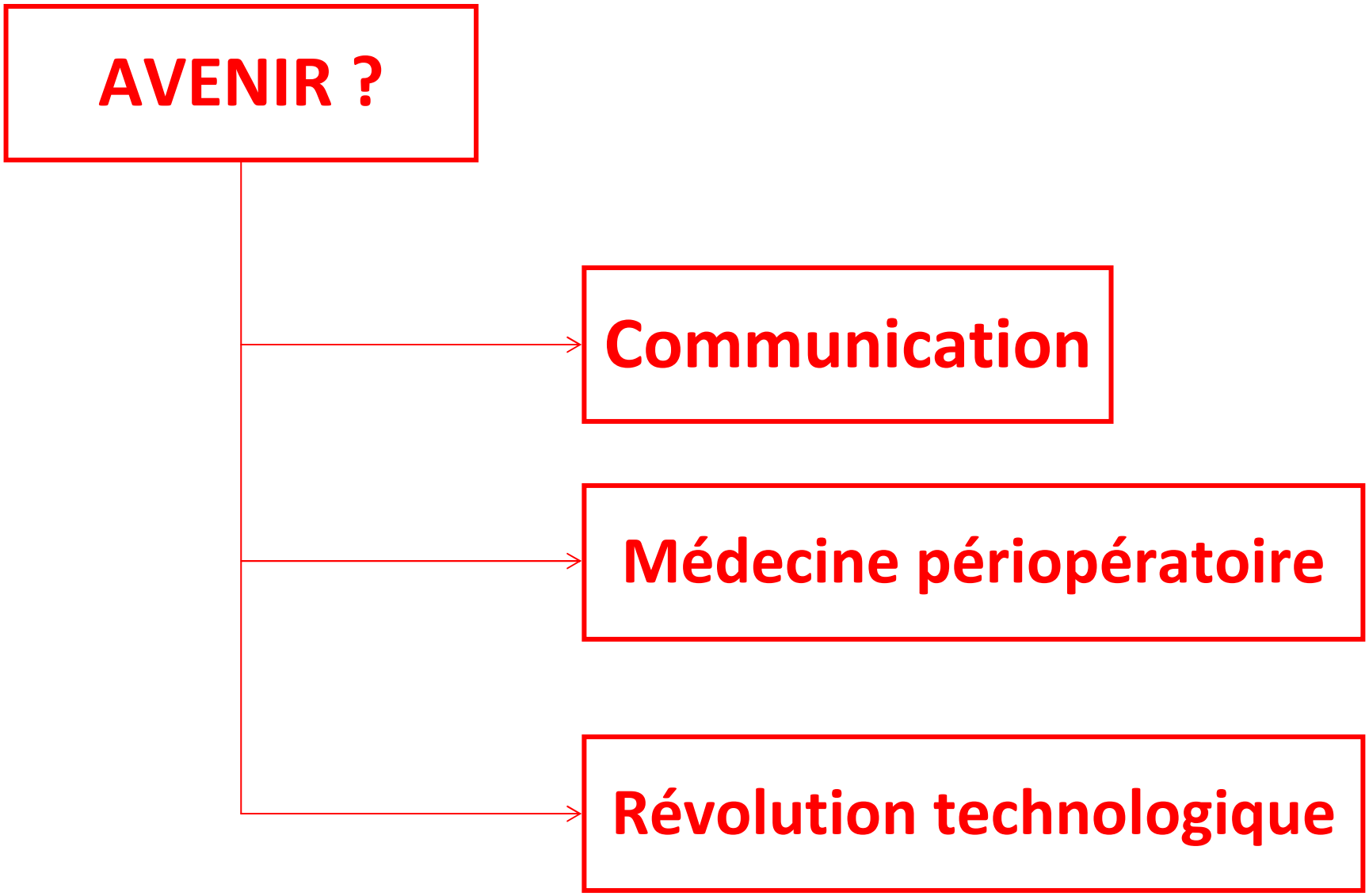
ASA : american society of anesthesiologists, AVC : accident vasculaire cérébral, BPCO : bronchopneumopathie chronique obstructive

Tableau IIIc

Proposition de stratégie de monitorage péri-opératoire en fonction du risque lié au patient et du risque lié à la chirurgie (selon les auteurs).

		Risque lié au type de chirurgie		
		Faible	Modéré	Elevé
Risque lié au patient	Faible	0	ID	Avancé
	Modéré	ID	ID	Avancé
	Elevé	Avancé	Avancé	Ultra avancé

0 : absence d'indication à un monitorage hémodynamique péri-opératoire, Avancé : monitorage hémodynamique avancé comportant au minimum le volume d'éjection systolique, ID : indices dynamiques de prédiction de la réponse au remplissage vasculaire, en respectant les critères de validité , Ultra avancé : monitorage hémodynamique et de l'adaptation du débit cardiaque.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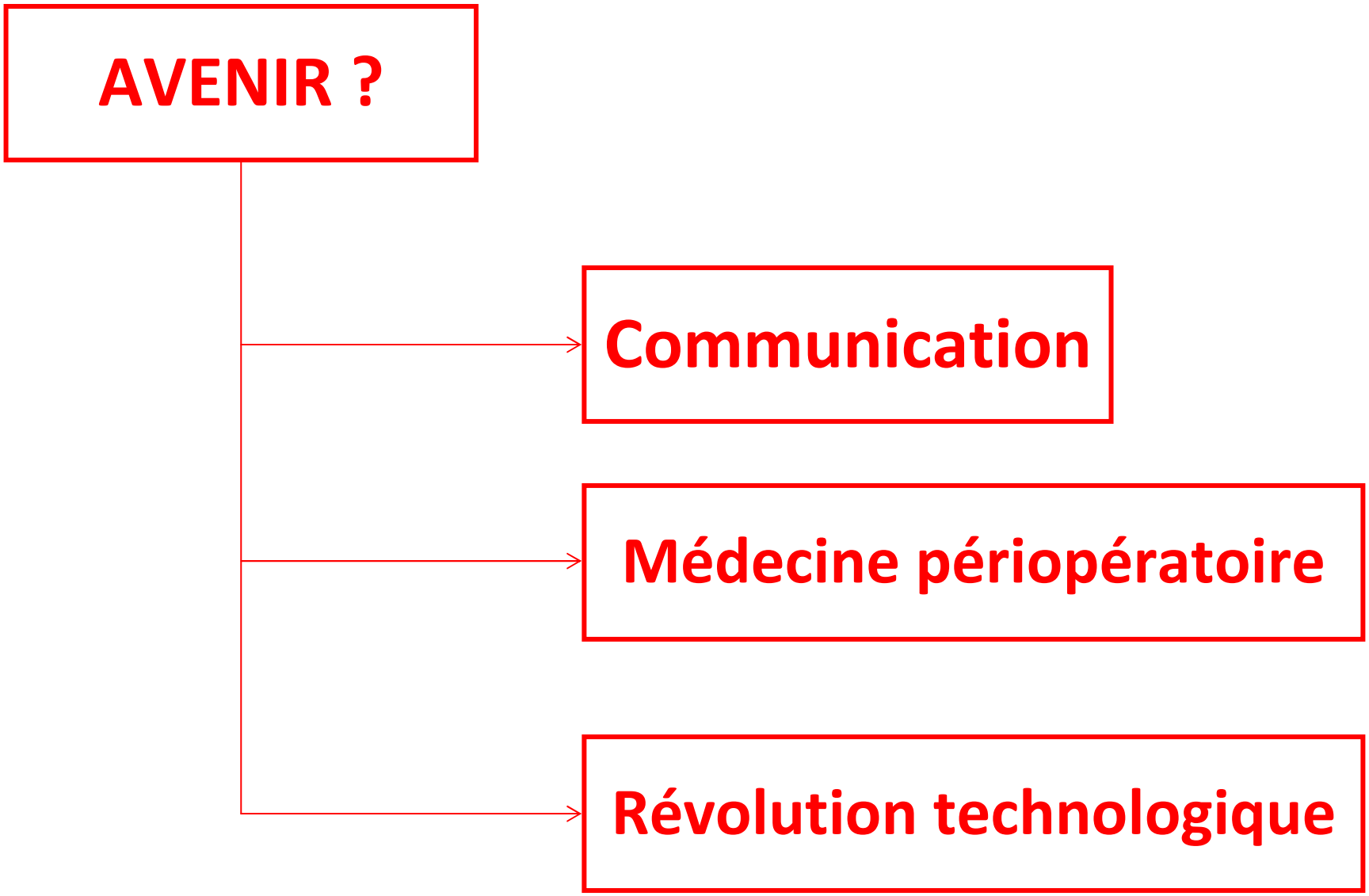
Médecine périopératoire
Révolution technologique



Sous couvert d'études de validation indépendantes