

Préparation cutanée: et quoi d'autre ?

PF Perrigault. CHU Montpellier



DÉCLARATION DE LIENS D'INTÉRÊTS

Conférencier: Pierre-François, PERRIGAULT, Montpellier

Je déclare les liens d'intérêt potentiel suivants :

Honoraires : MSD

Invitations congrès: MSD, Pfizer, Astellas

Introduction

- L'augmentation du nombre de comorbidités et l'émergence des BMR induisent une augmentation des couts et un véritable challenge devant toute nouvelle infection.
- La prévention des ISO est extrêmement importante au regard de l'activité chirurgicale qui ne cesse de croître.
- En appliquant des stratégies de prévention, environ 50% des ISO pourraient être évitées.
 - Umscheid, Infect Control Hosp Epidemiol, 2011.

16 Recommendations OMS

Lancet Infect Dis décembre 2016

Key research question	Recommendations for prevention of SSIs	Strength of recommendation (quality of evidence retrieved†)	Notes for implementation in low-income and middle-income countries	
(1) Perioperative oxygenation	How safe and effective is the perioperative use of high fraction of inspired oxygen in reducing the risk of SSI?	Adult patients undergoing general anaesthesia with endotracheal intubation for surgical procedures should receive 80% fraction of inspired oxygen intraoperatively and, if feasible, in the immediate postoperative period for 2–6 h	Strong recommendation (moderate)	Oxygen availability is low; oxygen and high-flow masks are an additional cost for the health-care facility or patient
(2) Maintaining normal body temperature (normothermia)	In surgical patients, should systemic body warming vs no warming be used for the prevention of SSI?	Warming devices are suggested for use in the operating room and during the surgical procedure for patient body warming	Conditional recommendation (moderate)	Availability of warming devices is low, particularly in low-resource settings; they are an additional cost for the health-care facility and require maintenance; simple blankets might function as efficiently as electrical devices
(3) Use of protocols for intensive perioperative blood glucose control	Do protocols aiming to maintain optimal perioperative blood glucose concentrations reduce the risk of SSI; and what are the optimal perioperative glucose target concentrations in diabetic and non-diabetic patients?	Protocols are suggested to be used for intensive perioperative blood glucose control for both diabetic and non-diabetic adult patients undergoing surgical procedures	Conditional recommendation (low)	Monitoring blood glucose adequately and treating hypoglycaemic events might be hard as medical staff training is required; availability, purchase, and storage (refrigerator) of insulin might cause financial burden
(4) Maintenance of adequate circulating volume control (normovolaemia)	Does the use of specific fluid management strategies during surgery affect the incidence of SSI?	Goal-directed fluid therapy is suggested for use intraoperatively	Conditional recommendation (low)	Some types of intravenous fluids might not be available; expertise in anaesthesia and medical staff training are required for the management of goal-directed fluid therapy and are often unavailable
(5) Disposable non-woven vs reusable woven drapes and gowns	Is SSI incidence affected by the use of disposable non-woven drapes and gowns vs reusable, woven drapes and gowns?‡	Either sterile disposable non-woven or sterile reusable woven drapes and surgical gowns can be used during surgical operations	Conditional recommendation (moderate to very low)	Availability of disposable drapes and gowns may be low and costs might cause a high financial burden, whereas labour costs for reprocessing reusable items may be less of an issue; the ecological effect of the additional clinical waste generated by use of single-use drapes and gowns should also be considered
(6) Adhesive incise drapes	Does the use of disposable adhesive incise drapes reduce the risk of SSI?	Plastic adhesive incise drapes with or without antimicrobial properties should not be used	Conditional recommendation (low to very low)	This recommendation avoids inappropriate resource allocation, because plastic adhesive incise drapes (in particular with antimicrobial properties) usually have an increased cost and they are not readily available in low-income and middle-income countries
(7) Wound-protector devices	Does the use of wound-protector devices reduce the incidence of SSI in open abdominal surgery?	Consider the use of wound-protector devices in clean-contaminated, contaminated, and dirty abdominal surgical procedures	Conditional recommendation (very low)	Wound-protector device availability is low and it is an additional cost for the health-care facility or patients; staff training is required; conflicting results exist from cost-effectiveness studies
(8) Incisional wound irrigation§ with an aqueous povidone-iodine solution	Does intraoperative wound irrigation with an aqueous povidone-iodine solution reduce the risk of SSI?	Consider the use of irrigation of the incisional wound with an aqueous povidone-iodine solution before closure, particularly in clean and clean-contaminated wounds	Conditional recommendation (low)	Availability of sterile products might be low; pulse pressure devices are scarce and have high costs, including purchase, waste disposal, procurement, energy, and machine maintenance

	Key research question	Recommendations for prevention of SSIs	Strength of recommendation (quality of evidence retrieved†)	Notes for implementation in low-income and middle-income countries
(Continued from previous page)				
(9) Incisional wound irrigation with antibiotics	Does intraoperative wound irrigation with antibiotics reduce the risk of SSI?	Antibiotic incisional wound irrigation before closure should not be used	Conditional recommendation (low)	This recommendation leads to a cost reduction because of reduced antibiotic use; it also contributes to preventing antimicrobial resistance
(10) Prophylactic negative-pressure wound therapy	Does prophylactic negative-pressure wound therapy reduce the incidence of SSI compared with the use of conventional dressings?	Prophylactic negative-pressure wound therapy on primarily closed surgical incisions is suggested in high-risk wounds, while taking resources into account	Conditional recommendation (low)	Prophylactic negative-pressure wound therapy device availability is low and is an additional cost for the health-care facility or patients (also because it can prolong hospital stay); however, evidence of cost-effectiveness in gynaecological patients has been shown; could construct a non-portable, locally made device at low cost
(11) Antimicrobial-coated sutures	Are antimicrobial-coated sutures effective to prevent SSI; if yes, when should they be used?	Triclosan-coated sutures are suggested to be used in all types of surgery	Conditional recommendation (moderate)	Antimicrobial-coated suture availability is low and they are an additional cost for the health-care facility or patient
(12) Laminar airflow ventilation systems in the context of operating room ventilation	Is the use of laminar airflow in the operating room associated with the reduction of overall or deep SSI; does the use of fans or cooling devices increase incidence of SSI; is natural ventilation an acceptable alternative?¶	Laminar airflow ventilation systems should not be used for patients undergoing total arthroplasty surgery	Conditional recommendation (low to very low)	In particular for the construction of future health-care facilities, this recommendation will reduce costs
(13) Antimicrobial prophylaxis in the presence of a drain	In the presence of drains, does prolonged antibiotic prophylaxis prevent SSI?	Perioperative surgical antibiotic prophylaxis should not be continued because of the presence of a wound drain for the purpose of preventing SSI	Conditional recommendation (low)	This recommendation leads to a cost reduction because of reduced antibiotic use; it also contributes to preventing antimicrobial resistance
(14) Optimal timing for wound drain removal	When using drains, how long should they be kept in place to minimise SSI as a complication?	The wound drain should be removed when clinically indicated; no evidence was found to make a recommendation on the optimal exact timing	Conditional recommendation (very low)	This recommendation has the potential to reduce costs because of a shortened hospital stay as a result of early drain removal
(15) Wound dressings	In surgical patients, should advanced dressings vs standard sterile wound dressings be used for the prevention of SSI?	No type of advanced dressing should be used over a standard dressing on primarily closed surgical wounds	Conditional recommendation (low)	This recommendation avoids inappropriate resource allocation, because advanced dressings are expensive and poorly available in low-income and middle-income countries
(16) Surgical antibiotic prophylaxis prolongation	Does continued postoperative surgical antibiotic prophylaxis reduce the risk of SSI compared with preoperative and (if necessary) intraoperative prophylaxis only?	Surgical antibiotic prophylaxis administration should not be prolonged after completion of the operation	Strong recommendation (moderate)	This recommendation leads to a cost reduction because of reduced antibiotic use; it also contributes to preventing antimicrobial resistance

Principales recommandations mises à jour par le CDC en 2017

1999: essentiellement avis d'expert; 2017 EBM: niveau de preuve (5000 études)

	Recommandations	Niveau preuve
Antibioprophylaxie	<ul style="list-style-type: none">• Seulement dans les indications validées par les Guidelines• La concentration tissulaire et sanguine optimale doit être obtenue à l'incision• Césarienne: injection avant incision	IB IA IA
Sutures	<ul style="list-style-type: none">• Utilisation de fils imprégnés de triclosan	II (faible)
Glycémie	<ul style="list-style-type: none">• Contrôle glycémique péri-opératoire avec objectif < 2 g/l chez tous les patients (diabétique ou non)	IA
Normothermie	<ul style="list-style-type: none">• Maintenir une normothermie péri-opératoire	IA
Oxygénation	<ul style="list-style-type: none">• Administrer des FiO2 augmentées per et post opératoire si fonction pulmonaire normale et IOT	IA
Antisepsie	<ul style="list-style-type: none">• Douche corps entier au moins la nuit précédant la chirurgie avec savon ou agent antiseptique	IB

*O'Hara, American J Infect Control 2018
Berrios Torres, JAMA Surgery 2017*

Ce qui n'est pas recommandé

Recommandations	Niveau preuve
<ul style="list-style-type: none">• Pas d'antibioprophylaxie après fermeture cutanée• Pas d'antibiotiques topiques sur incision chirurgicale	IA IB
<ul style="list-style-type: none">• Pas de plaquettes autologues riche en plasma	II
<ul style="list-style-type: none">• Ne pas éviter une transfusion nécessaire	IB
<ul style="list-style-type: none">• Ne pas utiliser en routine des champs adhésifs	II
<ul style="list-style-type: none">• Pas de lavage intrapéritonéal avec solution iodée même si contamination	II

O'Hara, American J Infect Control 2018
Berrios Torres, JAMA Surgery 2017

Faut-il systématiquement un niveau de preuve élevé pour mettre en œuvre une recommandation ?

- Place du bon sens ?

Parachute use to prevent death and major trauma related to gravitational challenge: systematic review of randomized controlled trials (Smith GCS et al, BMJ 2003)

Results: we were unable to identify any randomised controlled trials of parachute intervention.

Conclusions: (...) Advocates of evidence based medicine have criticised the adoption of interventions evaluated by using only observational data.



Parachutes reduce the risk of injury after gravitational challenge, but their effectiveness has not been proved with randomised controlled trials

Antibioprophylaxie

Antibioprophylaxie chirurgicale actualisée 2017

RFE SFAR/SPILF

Ce qui ne change pas:

- Ne concerne que la chirurgie « propre » ou « propre contaminée ».
- Doit être administrée 30 mn avant l'intervention (2 h si perf de vancomycine).
- Effectuer une réinjection si durée intervention > 2 demi-vies de l'antibiotique.
- Limitée à l'intervention, parfois 24 h, jamais > 48 h.
- Protocoles écrits par MAR et chirurgien, validés par le CLIN et COMAI et disponibles au bloc opératoire.
- Possibilité d'une antibiothérapie à la carte si risque particulier.
- Les dérogations au protocole doivent être exceptionnelles et argumentées.

Antibioprophylaxie chirurgicale actualisée 2017

RFE SFAR/SPILF

Ce qui change :

- Dose double standard jusqu'à 100 kg. Au-delà si IMC \geq 35/kg/m² encore doubler la β lact.
- Augmentation des doses de clindamycine à 900 mg et vanco 30 mg/kg en 2 h si nécessaire.
- Disparition de la cefoxitine seule en chirurgie digestive, urologique et gynécologique en raison du risque de résistance des anaérobies. En remplacement Pénicilline A + inhibiteur en 1^{ère} intention ou cefoxitine-flagyl.
- Ophthalmologie: levofloxacin PO remplacée par injection intracaméculaire de cefuroxime.
- Orthopédie: plus d'ajout systématique de gentamycine si vancomycine utilisée en cas d'allergie.
- Chirurgie digestive: ABP pour cure de hernie avec plaque.
- chirurgie bariatrique et obèse > 35 kg/m²: utiliser le poids réel pour dose de vancomycine et gentamycine
- Chirurgie plastique et reconstructive: remplacement Pénicilline + inhibiteur par cefazoline pour les classes 2 d'Altemeir.

Normothermie

Normothermia

Maintain perioperative normothermia Category IA

CDC

O'Hara, American J Infect Control 2018

Berrios Torres, JAMA Surgery 2017



Normothermie



- Hypothermie définie par $t^{\circ} < 36^{\circ}\text{C}$
- Rationnel
 - bloc: environnement froid (confort chirurgical)
 - La surface de peau exposée augmente la perte de chaleur
 - L'anesthésie inhibe le contrôle de la thermorégulation
 - Vasodilatation induite par l'anesthésie redistribue le sang du compartiment central en périphérie
 - Les fluides d'irrigation et de perfusion sont à t° ambiante
 - Hypothermie est fréquente si intervention majeure > 2 h
- Hypothermie augmente
 - Les pertes sanguines et les hématomes (coagulopathie)
 - les complications cardiaques
 - le risque ISO: Hypoxie tissulaire, Altère la fonction neutrophile

L'hypothermie augmente le risque d'ISO

2 études randomisées sur l'influence du contrôle t° et ISO

The New England Journal of Medicine

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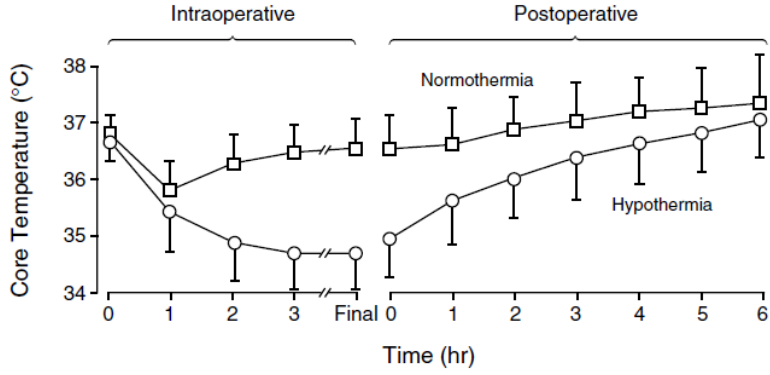
PERIOPERATIVE NORMOTHERMIA TO REDUCE THE INCIDENCE OF SURGICAL-WOUND
INFECTION AND SHORTEN HOSPITALIZATION

ANDREA KURZ, M.D., DANIEL I. SESSLER, M.D., AND RAINER LENHARDT, M.D.,
FOR THE STUDY OF WOUND INFECTION AND TEMPERATURE GROUP*

**Effects of preoperative warming on the incidence of wound
infection after clean surgery: a randomised controlled trial**

Melling, Lancet 2001

- 200 patients colectomie (104 NT/96HT)
 - T° per op: 34,7 °C (HT) vs 36,6°C (NT) p<0,001
 - ISO: 19% (HT) vs 6 % (NT) p=0,009
 - Durée séjour prolongée de 2,6j soit 20 % (HT) p=0,01
- Kurz, NEJM, 1996*



- 421 patients chirurgie propre (sein, varices, hernie)
 - Réchauffement pré-op (30 mn)
 - 3 groupes: HT (139), NT globale (139), NT locale (139)
 - T° significativement augmentée groupe NT p=0,001
 - Plus d'ATB en post op chez HT, p=0,002
- Melling, Lancet 2001*

Outcome	Local warming	Systemic warming	All warmed patients	Non-warmed patients	p*
Wound infection	5 (4%)	8 (6%)	13 (5%)	19 (14%)	0.001
ASEPSIS score					
0-10	130 (94%)	129 (93%)	259 (94%)	115 (83%)	
11-20	4 (3%)	4 (3%)	8 (3%)	7 (5%)	
21-30	3 (2%)	3 (2%)	6 (2%)	9 (7%)	
31-40	1 (0.7%)	1 (0.7%)	2 (0.7%)	6 (4%)	
>41	0	2 (1%)	2 (0.7%)	2 (1%)	0.007

Recommendation

The panel suggests the use of warming devices in the operating room and during the surgical procedure for patient body warming with the purpose of reducing SSI.

(Conditional recommendation, moderate quality of evidence)

Reco OMS 2016

Table 4.13.1. Recommendations on body temperature control (normothermia) according to available guidelines

Guidelines (date issued)	Recommendations on body temperature control (normothermia)
SHEA/IDSA (2014) (12)	Maintain normothermia (temperature of 35.5°C or more) during the perioperative period in surgical patients who have an anaesthesia duration of at least 60 minutes.
Royal College of Physicians of Ireland (2012) (13)	Body temperature maintained above 36° C in the perioperative period (excludes cardiac patients).
Health Protection Scotland bundle (2013) (14)	Body temperature maintained above 36° C in the perioperative period (excludes cardiac patients).
UK High impact intervention bundle (2011) (15)	Body temperature maintained above 36° C in the perioperative period.

Glycémie

Glycemic control

Implement perioperative glycemic control using blood glucose target levels <200 mg/dL in patients with and without diabetes

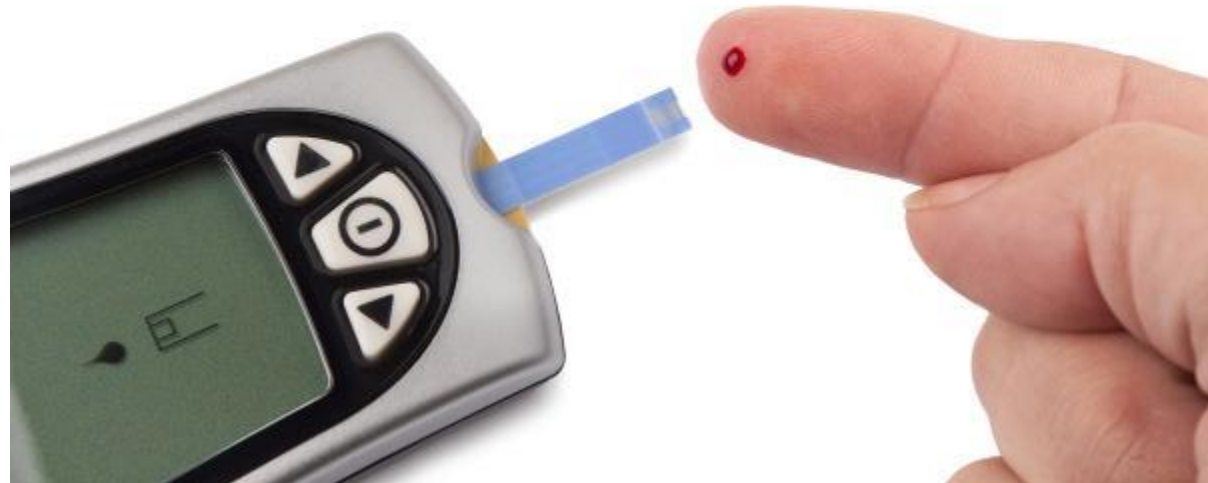
CDC, 2017

Category IA

OMS, 2016

Recommendation

The panel suggests the use of protocols for intensive perioperative blood glucose control for both diabetic and non-diabetic adult patients undergoing surgical procedures to reduce the risk of SSI.
(Conditional recommendation, low quality of evidence)



Rationnel

- **Stress chirurgical augmente le niveau de glycémie par:**
 - Relargage d'hormones cataboliques
 - Résistance à l'insuline
 - Diminution sécrétion d'insuline
 - Chez le diabétique et non diabétique

- **Plusieurs études observationnelles ont montré que l'hyperglycémie était associée à une augmentation des ISO, de la morbidité, et cout chez le diabétique et non diabétique.**

McAnulty, Br J Anaesth 2000

Kotagal, Ann Surg 2015

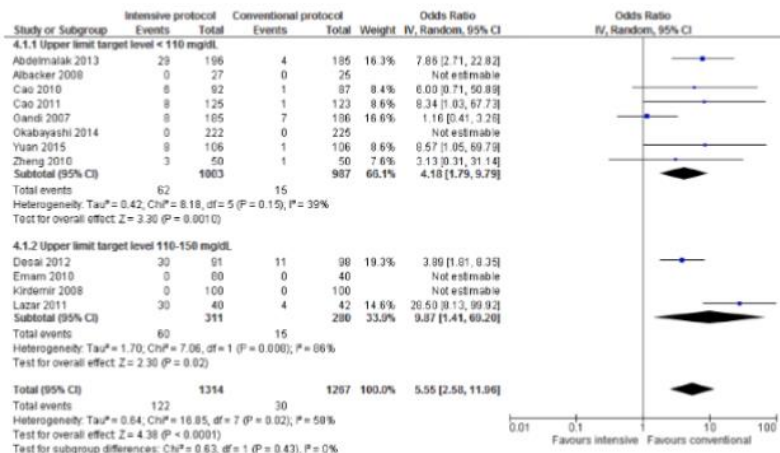
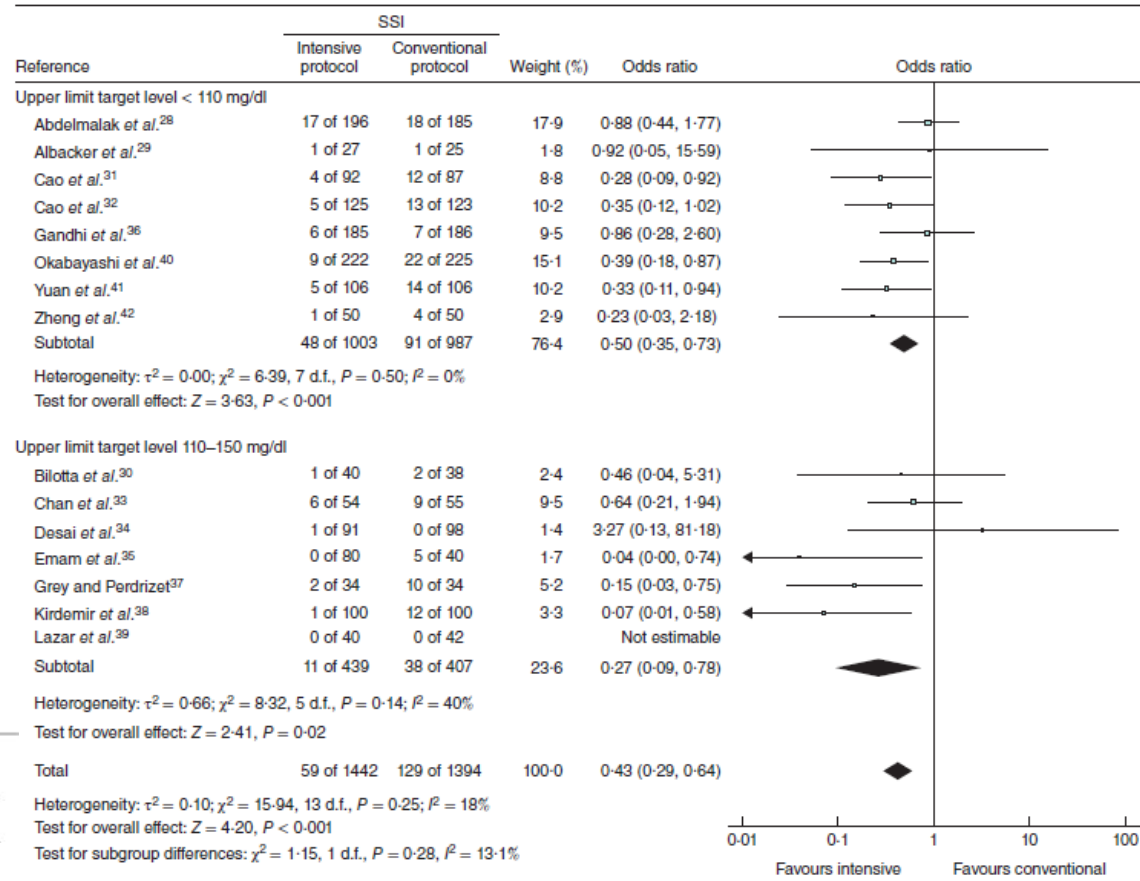
Ata, Arch Surg 2010

Meta-analysis of lower perioperative blood glucose target levels for reduction of surgical-site infection

De Vries, Br J Surg 2017

15 RCT (2 per op, 8 per et post op, 5 post op)

- 5 diabétiques
- 8 mixtes
- 2 non diabétiques
- 9 chirc cardiaque
- 4 chirc digestive
- Aucune: ISO objectif principal
- Moins d'ISO contrôle strict
- Biais élevé
- Plus d'hypoglycémies +++



hypoglycémie

Guidelines (year issued)	Recommendations on perioperative blood glucose control Evolution des recommandations vers le non diabétique
SHEA/IDSA practice recommendation (2014) (25)	Control blood glucose during the immediate postoperative period for cardiac and non-cardiac surgery patients. a) Maintain postoperative blood glucose at 180 mg/dL or lower. b) Intensive postoperative glucose control (targeting levels less than 110 mg/dL) has not been shown to reduce the risk of SSI and may actually lead to higher rates of adverse outcomes, including stroke and death.
NICE (2008) (28)	<u>Do not give insulin routinely to patients who do not have diabetes</u> to optimize blood glucose postoperatively as a means of reducing the risk of SSI.
Health Protection Scotland bundle (2013) (29)	Ensure that the <u>diabetic patient's</u> glucose level is kept at <11 mmol/L throughout the operation.
The Royal College of Physicians of Ireland (2012) (30)	Ensure that if the patient is <u>diabetic</u> that the glucose level is kept at <11 mmol/L throughout the operation.
UK High impact intervention bundle (2011) (31)	A glucose level of <11 mmol/L has to be maintained in <u>diabetic patients</u> .
The Society of Thoracic Surgeons practice guideline series (2009) (27)	All patients <u>with diabetes</u> undergoing cardiac surgical procedures should receive an insulin infusion in the operating room and for at least 24 hours postoperatively to maintain serum glucose levels ≤ 180 mg/dL
American College of Physicians: clinical practice guideline (2011) (26)	<u>Do not use intensive insulin therapy</u> (4.4 to 6.1 mmol/L [80 to 110 mg/dL]) to normalize blood glucose in SICU/MICU patients with or without diabetes mellitus. A target blood glucose level of 7.8 to 11.1 mmol/L (140 to 200 mg/dL) is recommended if insulin therapy is used in SICU/MICU patients.

Oxygénation

Oxygenation

Administer increased fraction of inspired oxygen intraoperatively and in the immediate postoperative period following extubation for all patients with normal pulmonary function undergoing general anesthesia with endotracheal intubation

Category IA

CDC

O'Hara, American J Infect Control 2018

Berrios Torres, JAMA Surgery 2017



Recommendation

The panel recommends that adult patients undergoing general anaesthesia with endotracheal intubation for surgical procedures should receive an 80% fraction of inspired oxygen (FiO₂) intraoperatively and, if feasible, in the immediate postoperative period for 2-6 hours to reduce the risk of SSI.

(Strong recommendation, moderate quality of evidence)

WHO, Lancet Infect Dis 2016

Table 4.12.1. Recommendations on oxygenation preparation according to available guidelines

Guidelines (date issued)	Recommendations on oxygenation preparation
SHEA/IDSA (2014) (17)	Optimize tissue oxygenation by administering supplemental oxygen during and immediately following surgical procedures involving mechanical ventilation.
NICE (2008) (15)	Sufficient oxygen to maintain a haemoglobin saturation of more than 95%
The Royal College of Physicians of Ireland (2012) (18)	Haemoglobin saturation is maintained above 95% (or greater if there is underlying respiratory insufficiency).
Health Protection Scotland bundle (2013) (13)	Haemoglobin saturation is maintained above 95% (or greater if there is underlying respiratory insufficiency).
UK High impact intervention bundle (2011) (16)	Haemoglobin saturation is maintained above 95% (or greater if there is underlying respiratory insufficiency) both during the intra- and postoperative stages (recovery room).

- **Rationnel**

- Principe: Amener plus d'O₂ sur le site opératoire
- Le processus de cicatrisation comprend de l'hémostase, de l'inflammation, de la prolifération, de l'épithélialisation. Toutes ces phases nécessitent de l'O₂. *Yip, Int Wound J. 2015*
- L'incision chirurgicale peut être insuffisamment perfusée.
- Des hautes pressions partielles en O₂ ↑ l'activité des PNN.
- En cas d'infection, ↓ PO₂ tissulaire localement.
- Quelques études randomisées positives.

- **Limites**

- Pourtant pas utilisé en routine !!!
- Pourquoi ?

Méta analyse

11 études randomisées sous AG

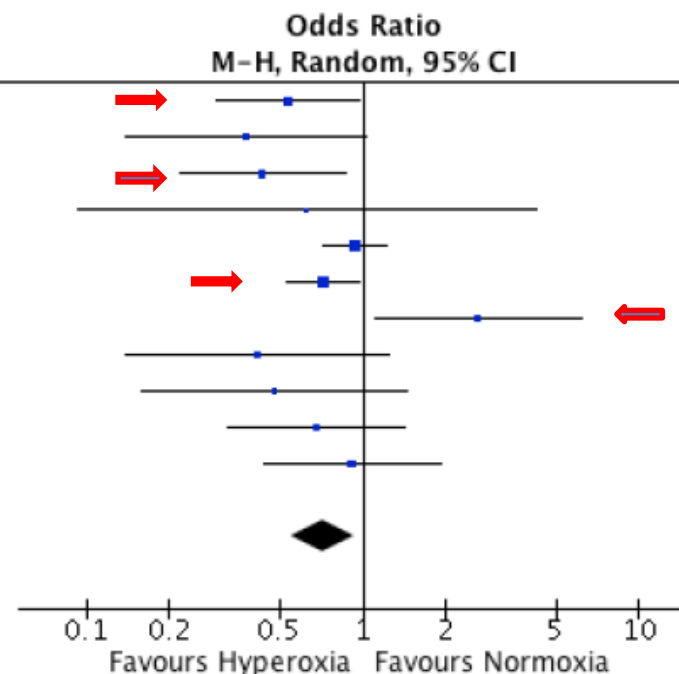
Objectif: % ISO , mortalité attribuable ISO

3 études significativement positives, 1 en défaveur,

7 favorables mais pas significativement

Study or Subgroup	Hyperoxia		Normoxia		Weight	Odds Ratio
	Events	Total	Events	Total		M-H, Random, 95% CI
Belda 2005	22	148	35	143	11.2%	0.54 [0.30, 0.97]
Bickel 2011	6	107	14	103	5.6%	0.38 [0.14, 1.02]
Grief 2000	13	250	28	250	9.5%	0.43 [0.22, 0.86]
Mayzler 2005	2	19	3	19	1.8%	0.63 [0.09, 4.26]
Meyhoff 2009	131	685	141	701	19.7%	0.94 [0.72, 1.22]
Myles 2007	77	997	106	1015	18.5%	0.72 [0.53, 0.98]
Pryor 2004	20	80	9	80	7.0%	2.63 [1.11, 6.20]
Schietroma 2013	5	86	11	85	4.8%	0.42 [0.14, 1.25]
Schietroma 2014	6	40	11	41	4.7%	0.48 [0.16, 1.46]
Stall 2013	14	119	19	116	8.5%	0.68 [0.32, 1.43]
Thibon 2012	15	226	15	208	8.6%	0.91 [0.44, 1.92]
Total (95% CI)		2757		2761	100.0%	0.72 [0.55, 0.94]

Total events 311 392
Heterogeneity: $\tau^2 = 0.08$; $\chi^2 = 18.51$, $df = 10$ ($P = 0.05$); $I^2 = 46\%$
Test for overall effect: $Z = 2.44$ ($P = 0.01$)



Par type de chirurgie

Study or Subgroup	Hyperoxia		Normoxia		Weight	Odds Ratio M-H, Random, 95% CI
	Events	Total	Events	Total		
1.1.1 Colorectal Procedures(Open)						
Belda 2005	22	148	35	143	11.2%	0.54 [0.30, 0.97]
Grief 2000	13	250	28	250	9.5%	0.43 [0.22, 0.86]
Mayzler 2005	2	19	3	19	1.8%	0.63 [0.09, 4.26]
Schietroma 2014	6	40	11	41	4.7%	0.48 [0.16, 1.46]
Subtotal (95% CI)		457		453	27.3%	0.50 [0.33, 0.74]

Total events 43 77
 Heterogeneity: $\tau^2 = 0.00$; $\chi^2 = 0.28$, $df = 3$ ($P = 0.96$); $I^2 = 0\%$
 Test for overall effect: $Z = 3.39$ ($P = 0.0007$)

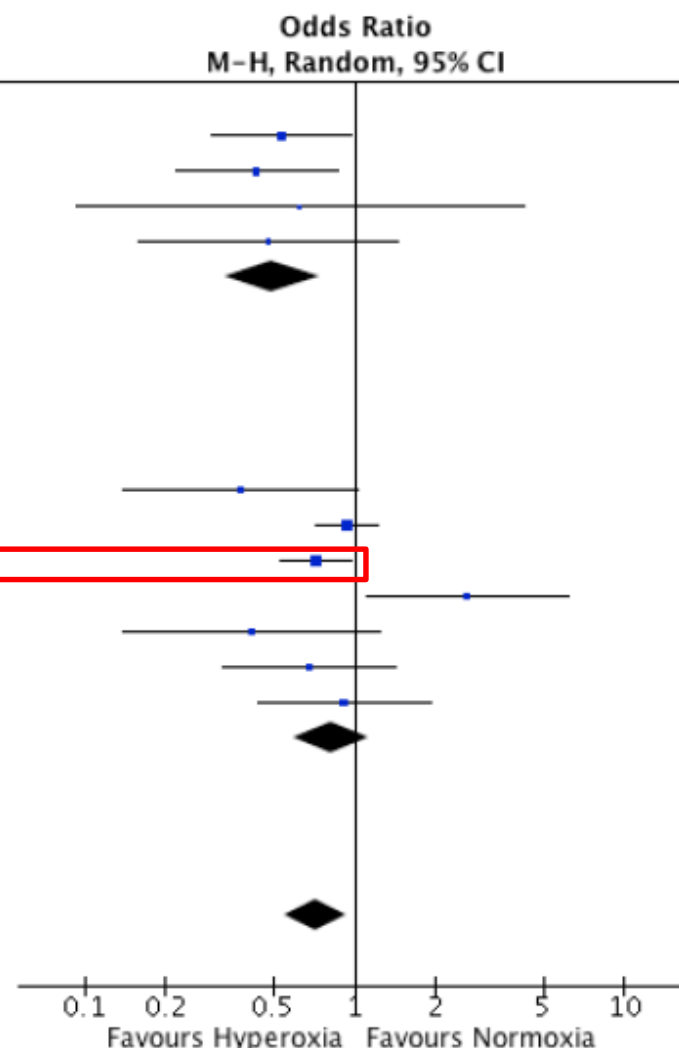
1.1.3 Other / Mixed

Bickel 2011	6	107	14	103	5.6%	0.38 [0.14, 1.02]
Meyhoff 2009	131	685	141	701	19.7%	0.94 [0.72, 1.22]
Myles 2007	77	997	106	1015	18.5%	0.72 [0.53, 0.98]
Pryor 2004	20	80	9	80	7.0%	2.63 [1.11, 6.20]
Schietroma 2013	5	86	11	85	4.8%	0.42 [0.14, 1.25]
Stall 2013	14	119	19	116	8.5%	0.68 [0.32, 1.43]
Thibon 2012	15	226	15	208	8.6%	0.91 [0.44, 1.92]
Subtotal (95% CI)		2300		2308	72.7%	0.82 [0.59, 1.13]

Total events 268 315
 Heterogeneity: $\tau^2 = 0.08$; $\chi^2 = 12.86$, $df = 6$ ($P = 0.05$); $I^2 = 53\%$
 Test for overall effect: $Z = 1.20$ ($P = 0.23$)

Total (95% CI) **2757** **2761** **100.0%** **0.72 [0.55, 0.94]**

Total events 311 392
 Heterogeneity: $\tau^2 = 0.08$; $\chi^2 = 18.51$, $df = 10$ ($P = 0.05$); $I^2 = 46\%$
 Test for overall effect: $Z = 2.44$ ($P = 0.01$)
 Test for subgroup differences: $\chi^2 = 3.64$, $df = 1$ ($P = 0.06$), $I^2 = 72.6\%$



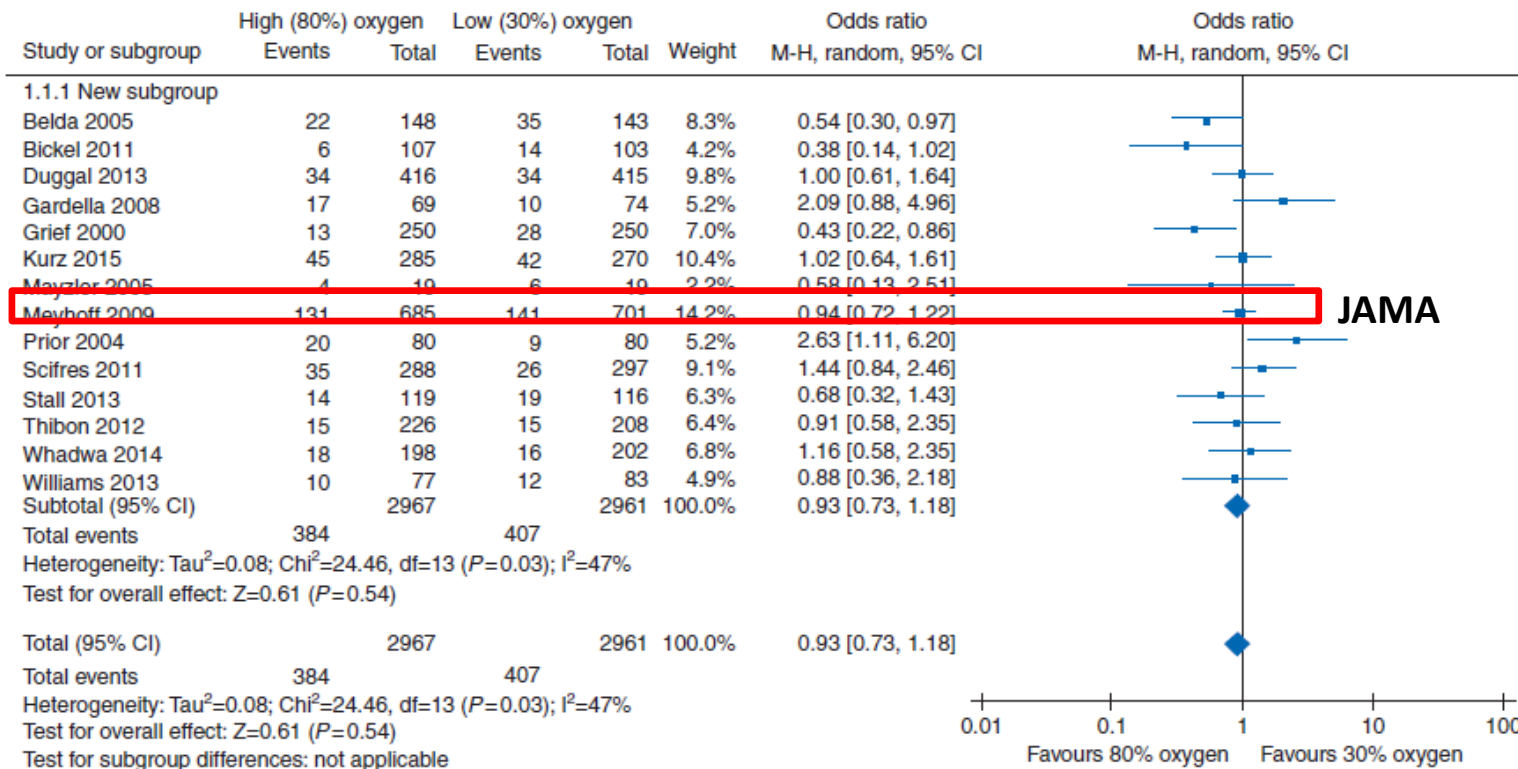
Supplemental oxygen and surgical site infection: getting to the truth

Myles Br J Anaesth 2017

Myles: Étude non randomisée sur l'O2

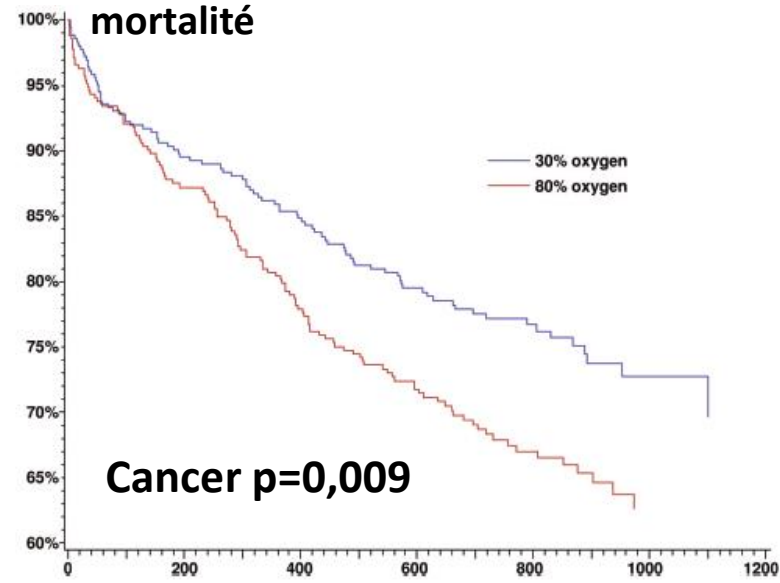
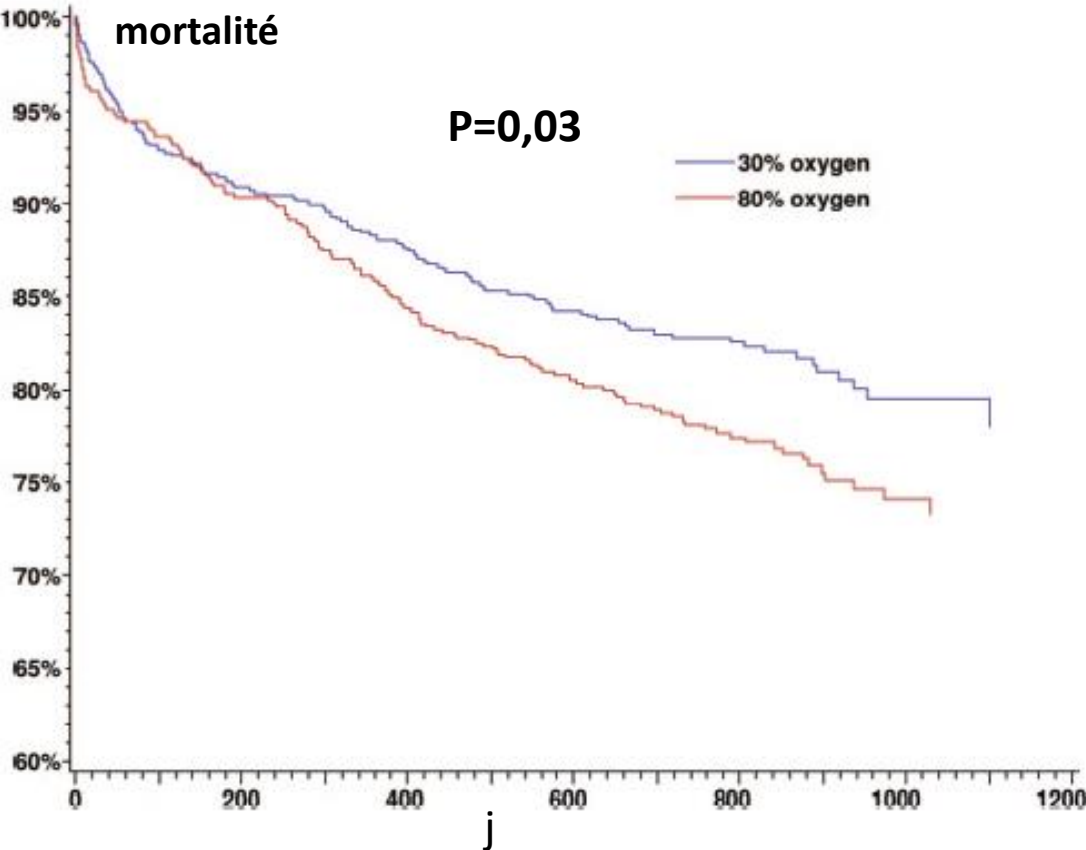
2 études oubliées

3 études incluant des césariennes sous anesthésie spinale



Increased Long-Term Mortality After a High Perioperative Inspiratory Oxygen Fraction During Abdominal Surgery: Follow-Up of a Randomized Clinical Trial

Meyhoff, Anesth Analg 2012



Supplemental oxygen and surgical-site infections: an alternating intervention controlled trial *Kurtz, Br J Anaesth 2018*

Chirurgie intestinale majeure > 2 h

FiO2 80% vs 30% alternativement tous le 15 j pdt 39 mois

Objectif principal: score composite (ISO, lâchage anastomose, sepsis, éventration, mortalité)

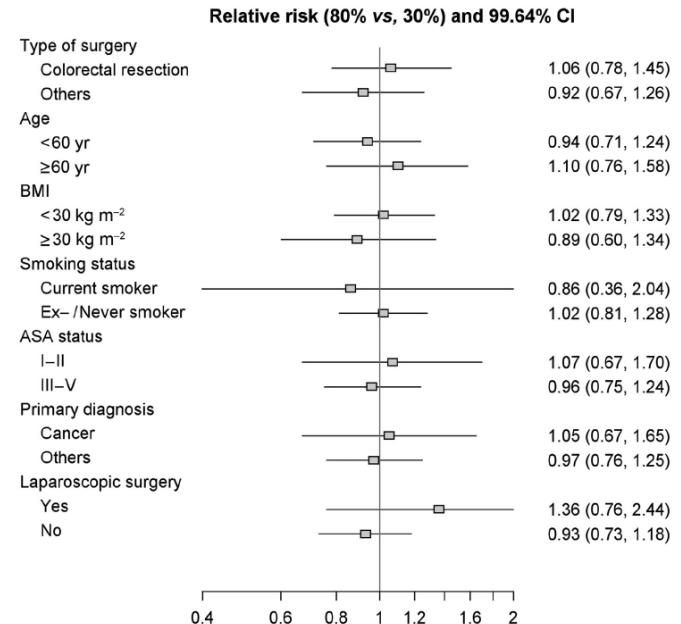
30-DAY complications	80% oxygen (N=2896)*	30% oxygen (N=2853)*	Relative risk (95% CI) [†] (80% vs 30%)	P-value [†]
SSI (organ space/deep)	118 (4.1)	112 (3.9)	1.04 (0.74, 1.46)	0.77
Anastomotic leak	34 (1.2)	36 (1.3)	0.94 (0.50, 1.75)	0.79
Intra-abdominal abscess	133 (4.6)	143 (5.0)	0.91 (0.67, 1.24)	0.44
Sepsis	96 (3.3)	94 (3.3)	1.01 (0.69, 1.49)	0.95
Wound dehiscence	43 (1.5)	43 (1.5)	0.99 (0.57, 1.72)	0.96
Death	20 (0.7)	10 (0.4)	1.97 (0.71, 5.47)	0.08
Any of the above	314 (10.8)	314 (11.0)	0.99 (0.85, 1.14)	0.85

5749 patients (dont 49 % résections coliques).

2896 (FiO2 80%)/ 2853 (FiO2 30 %)

Aucune différence sur score composite

Pas de facteurs confondants



The New World Health Organization Recommendations on Perioperative Administration of Oxygen to Prevent Surgical Site Infections: A Dangerous Reductionist Approach?

Anesth Analg 2017

Manuel Wenk, MD, PhD, Hugo Van Aken, MD, PhD, and Alexander Zarbock, MD, PhD

Forte recommandation mais niveau de preuve modéré

• O₂: ami ou ennemi ?

- Toxicité O₂ sur SNC démontré par Paul Bert en 1878: « effet Paul Bert »: vertiges, céphalées, vomissements, convulsions...
- Toxicité 100% FiO₂ sur poumon: atélectasie, œdème, dyspnée,...

Probablement par le biais de la production de radicaux libres (O₂⁻, OH⁻)

Altemeier, Curr Opin Crit Care 2007

- Toxicité directe de L'hyperoxie sur la cellule humaine cardiaque, hépatique Rénale,...

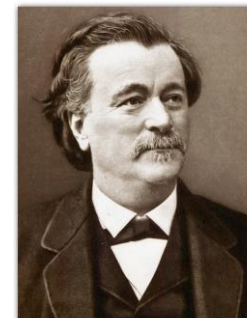
Hafner. Shock 2017, Eur J Anesthesiol 2017

- Effet indésirable majoré après ischémie-reperfusion.
- Mortalité augmentée chez les AVC intubé si PaO₂ > 300 mmHg

Rincon. Crit Care 2014

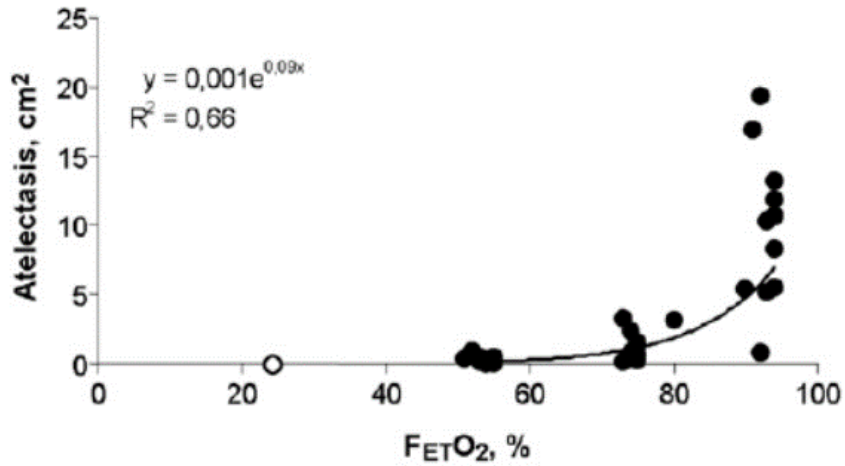
- Au cours de l'IDM, O₂ augmente les ré-infarctions, troubles du rythme...

Stub. Circulation 2015

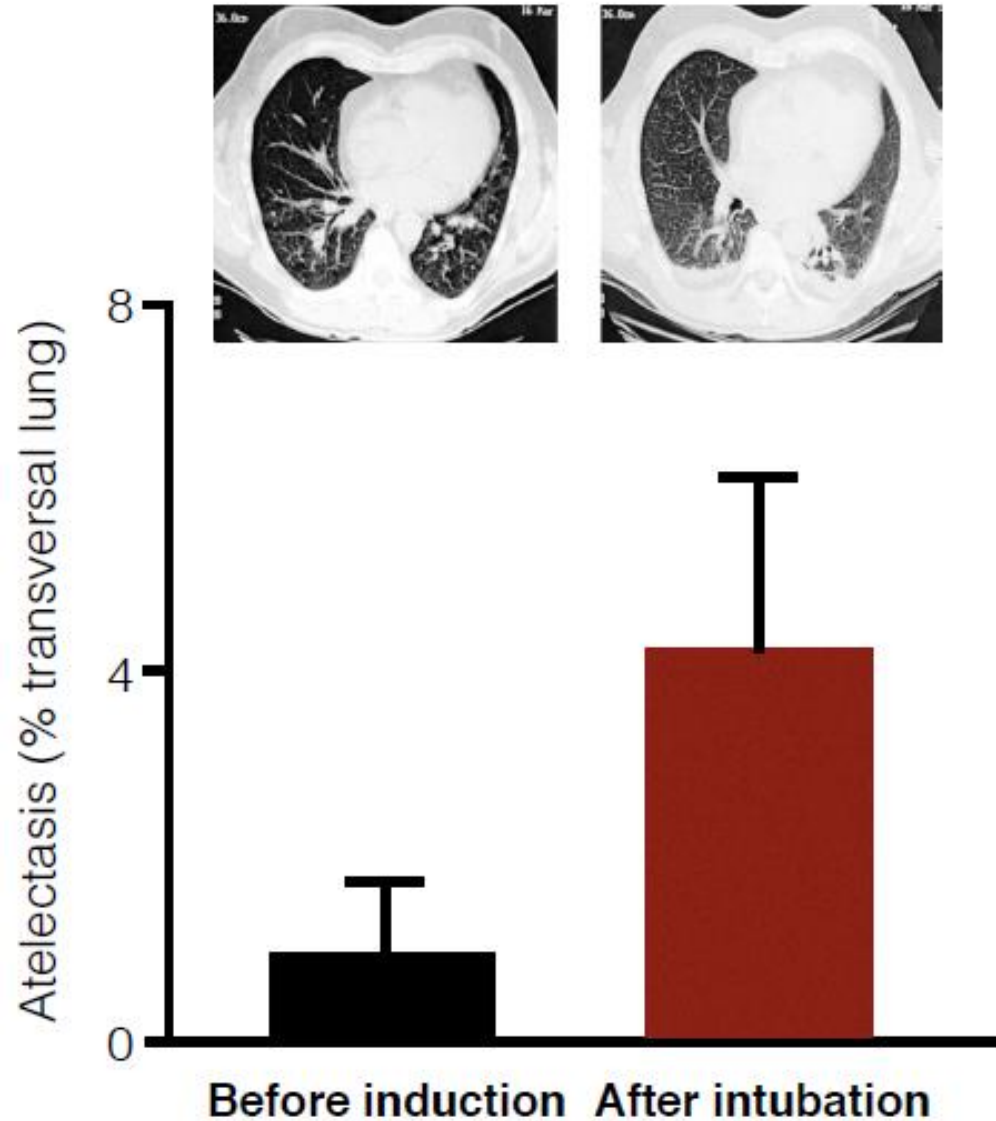


Problème des atélectasies

Rusca, Anesth Analg 2003



Edmark, Anesthesiology 2003



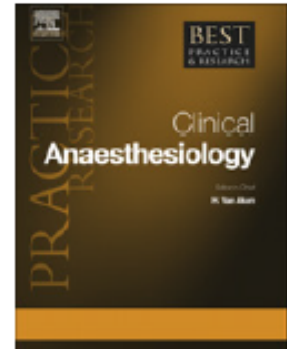


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Avoid unnecessarily high oxygen fraction during the anaesthesia and surgical procedure, in most patients FIO_2 0.3–0.4 should suffice;

Recommendation

The panel recommends that adult patients undergoing general anaesthesia with endotracheal intubation for surgical procedures should receive an 80% fraction of inspired oxygen (FiO_2) intraoperatively and, if feasible, in the immediate postoperative period for 2-6 hours to reduce the risk of SSI.

(Strong recommendation, moderate quality of evidence)

GLOBAL GUIDELINES
FOR THE PREVENTION OF
SURGICAL SITE INFECTION



Débat non réglé !!

Conclusion

- **« Normo »: le mieux est l'ennemi du bien**
 - Normovolémie
 - Normothermie
 - Normoglycémie
 - Normotension
 - Normoventilation et oxygénation ?
- **Antibioprophylaxie suivant les recommandations**