Κριτήρια διασωλήνωσης ασθενούς στον παθολογικό θάλαμο

Ηρακλής Τσαγκάρης

Καθηγητής Πνευμονολογίας-Εντατικής Θεραπείας

Β’ Κλινική Εντατικής Θεραπείας - Νοσοκομείο Αττικόν

Phasic contraction of sternomastoid muscle (↑WOB)

Clin Chest Med 40 (2019) 243–257
https://doi.org/10.1016/j.ccm.2019.02.012

Tracheal tug with each inspiration effort (↑WOB)

Clin Chest Med 40 (2019) 243–257
https://doi.org/10.1016/j.ccm.2019.02.012

Suprasternal fossa recession in inspiration (↑WOB)

Clin Chest Med 40 (2019) 243–257
https://doi.org/10.1016/j.ccm.2019.02.012

Presence of diaphoresis (↑WOB)

Clin Chest Med 40 (2019) 243–257
https://doi.org/10.1016/j.ccm.2019.02.012

Watching breathing pattern surreptitiously

(in order to evade the cofounding influence of the Heisenberg principle)

Clin Chest Med 40 (2019) 243–257
https://doi.org/10.1016/j.ccm.2019.02.012

Intubation challenges in non-OR setting

Guidance	• Existing anaesthesia guidance not always applicable. • Limited evidence base.	Recognizes critical illness as a special circumstance. Comprehensive literature review and broad clinical consensus.
Areas outside OR especially ED	• Environmental, staff, monitoring, and equipment factors are often compounded, leading to increased risks of failure and patient harm.	Common approach for all areas managing the critically ill. Encouraging joint training, purchasing and incident review.
ICU environment	• ICU bed space not designed for airway management. • Bed space crowded with monitors and other equipment: limit access to patient, especially at head end. • Lighting often suboptimal.	Common airway management trolleys brought to bedside. Optimal positioning recommended.
Equipment	• Airway equipment different from OR. • Access to advanced equipment may be limited and delayed in an emergency.	Recommendation for availability of standardized airway trolley, VL, FOS and capnography. Purchasing with all users in mind.

British Journal of Anaesthesia, 120 (2): 323–352 (2018)

Intubation challenges in non-OR setting

Monitoring	• Monitoring usually positioned for end of bed viewing in ED and ICU. • Capnography not always available. • ET oxygen not always available.	Team brief identifies individual responsible for monitoring. Minimum monitoring recommendation.
Training	• Limited low-risk cases for training. • Infrequent exposure to airway management especially advanced and rescue techniques.	Training programs including bedside simulation using local equipment. Local training to ensure relevance of skills. Central human factors approach
Human factors Team working	• Multiprofessional environment. • Inconsistent team membership. • Equipment may be unfamiliar.	Structured algorithm Team briefs, checklist, handover, and signage. Leader and empowered follower roles explained. Joint training. Equipment limited to first choice and one alternative only.
Transfers	• High-risk period. • Remote working. • Often delegated to junior staff. • Unfamiliar equipment and environment.	Highlight importance of senior involvement, planning, risk assessment, team training, and standardized equipment.
Airway assessment	• May be time limited. • Medical devices (collars, masks) and altered conscious level and lack of	Evidence-based assessment tool. Prompt to assess risk and identify cricothyroid membrane linked to

British Journal of Anaesthesia, 120 (2): 323–352 (2018)

Intubation challenges in non-OR setting: Patient factors

Aspiration risk	• Patients often not fasted. • Pathology and drugs cause gastric stasis. • Oxygenation with CPAP, NIV, HFNO may risk gastric distention. • NGT often *in situ*.	Modified RSI and cricoid force advocated, with prompt removal if necessary. Head-up position recommended.
Difficult airways	• Increased incidence of oedema, trauma, immobilized neck, prior intubation, tracheostomy. • Acute ED presentation. • Urgency increases difficulty. • 6% ICU patients are admitted for difficult airway observation, extubation, or both • Anatomically normal airways become physiologically difficult due to rapid deterioration, decreased reserve, and urgency.	Recognition and preparedness for difficult intubation. MACOCHA score used. Care plan for intubated patients Optimal oxygenation techniques Limit on attempts at instrumentation. Use of cognitive aid and early use of VL. Neuromuscular blockade routinely. Plan for failure. Triggered transition to FONA.

British Journal of Anaesthesia, 120 (2): 323–352 (2018)

Intubation challenges in non-OR setting: Patient factors

Preoxygenation	• Pulmonary shunt interferes with effective pre- and peroxygenation. • Lack of cooperation common (delirium or reduced conscious level).	CPAP, NIV or nasal oxygenation. Head-up position emphasized. Recruitment manoeuvre. DSI described.
Special circumstances	• Cervical spine trauma • Burns	Management recommendations.
Respiratory physiology	• Pulmonary shunt causes rapid desaturation and impedes reoxygenation. • Limited time for airway management before life-threatening hypoxia. • Need for TT for effective oxygenation. • Bronchospasm causes breath-stacking.	Optimal pre- and peroxygenation techniques including PEEP described. Logical, prompt progression through airway techniques emphasized. Strategies for intubation and TT change described.

British Journal of Anaesthesia, 120 (2): 323–352 (2018)

Intubation challenges in non-OR setting: Patient factors

CVS physiology	• Unstable, collapse imminent before intubation. • Standard induction drugs problematic. • Instability leads to time pressure.	Preinduction optimization. Ketamine recommended. Proactive use inotropes or pressors.
Urgency	• May be no time to assemble expert team in ICU or ED or even perform adequate assessment, pre-oxygenation or stabilization.	Checklist to improve reliability of care: standardized trolley; communication stressed; technique standardized; team roles identified.
Awake intubation often inappropriate	• Hypoxia, agitation or reduced conscious level often precludes awake intubation.	RSI with double set-up emphasized. DSI recommended.
No wake up if fail	• Critical illness usually precludes wake-up as rescue: reduced conscious level +/− hypoxia already.	Proactive decision before induction.
Positioning	• Optimal positioning may not be feasible. • ICU management requires frequent turns, movement for procedures, manipulation near airway and prone positioning.	Identification of high-risk periods. Turns in high-risk patients require dedicated airway personnel. Intubated patient red flags to identify displaced airway device.

British Journal of Anaesthesia, 120 (2): 323–352 (2018)

Intubation challenges in non-OR setting: Patient factors

Sedation and agitation	• Sedation holds risk airway displacement • Agitation precludes adequate preparation.	Identification of high risk periods. Caution over sedation holds in difficult airway. DSI described.
Airway maintenance	• Prolonged intubation, increased secretions, and procedures all risk blockage and displacement. • Multiple professional teams manage and maintain the airway.	Intubated patient care plan highlighted. Intubated patient red flags. Team training including simulation.
Tracheostomy and laryngectomy	• Higher incidence of tracheostomy with increased risk of blockage/displacement. • Junior staff unfamiliar with and cognitively challenged by tracheostomy management.	Recognition of tracheostomy insertion skills. Red flags also appropriate. Signposting to tracheostomy resources.
Increasing incidence of obesity	• Obese tolerate airway management poorly. Short safe apnoeic time. • Positioning, oxygenation, FMV, FONA	MACOCHA highlights increased risk. Strategies for airway management described.

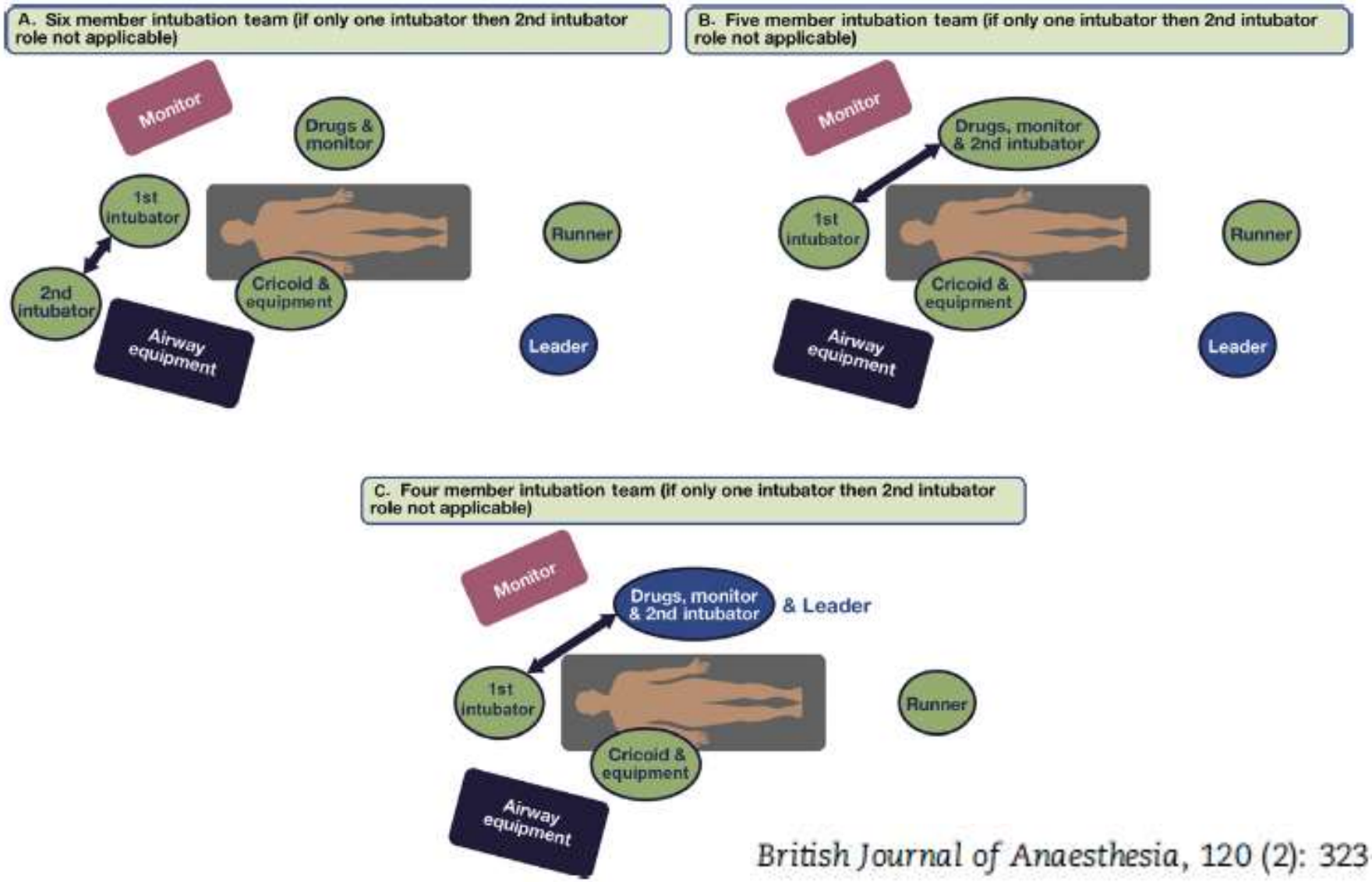
British Journal of Anaesthesia, 120 (2): 323–352 (2018)

Intubation challenges in non-OR setting: Staff

Resource	• Nursing, medical and AHP often lack anaesthetic airway experience. • Senior staff not continually present. • May lack out of hours airway cover. • Routine airway care and maintenance performed by nurses. • Capnography not universal. • Equipment not OR standard.	Communication and handover emphasized. Multiprofessional training. Checklist identifies defined roles. Role of arriving expert defined. Waveform capnography mandated. Equipment choice limited.
Training	• Focused airway training in ED and ICU infrequent. • Doctors may not have anaesthesia and airway skills. • Nursing airway and crisis management training rare. • Critically ill not recognized as specific airway-risk.	Focus on risk assessment, prevention of hypoxia and early request for advanced airway skills. Airway red flags. Specific guideline presented. Team training emphasized.
Immediate Surgical availability	• Rare. May be distant from hospital	Pre-emptive identification of at risk patients. Early intubation: not out of hours if possible. FONA experience recognized.

British Journal of Anaesthesia, 120 (2): 323–352 (2018)

Composition and role of intubation teams



British Journal of Anaesthesia, 120 (2): 323–352 (2018)

Ethics

Το «δίλημμα ?» στην Ιπποκρατική Ιατρική

Ο Ιπποκράτης από τη μια δηλώνει:

«*και να μου το ζητήσουν, φάρμακο θανατηφόρο σε κανέναν δεν θα δώσω*»

(Ιπποκρατικός Όρκος)

και από την άλλη μας παροτρύνει:

«*να μην επεμβαίνουμε στις περιπτώσεις που οι άρρωστοι έχουν πια τελείως νικηθεί από την αρρώστια τους*» και αυτό «*με πλήρη συνείδηση πως η Ιατρική δεν έχει τη δύναμη να κάνει το παν*» **(Ιπποκράτης, «Περί Τέχνης», παρ.III,5).**

The problem

- High-intensity care in the intensive care unit (ICU), although beneficial for many, also has the potential to be burdensome and costly, especially for patients with chronic, life-limiting illnesses who are near the end of life.

Pio XII (1957)

“Είναι αποδεκτή η διακοπή ιατρικών πράξεων που ειναι πολυέξοδες, επεμβατικές, εξαιρετικές ή δυσανάλογες με το προσδοκώμενο αποτέλεσμα..... Δε θεωρούμε οτι προκαλούμε έτσι το Θάνατο, απλά αποδεχόμαστε το γεγονός ότι δεν μπορούμε να τον εμποδίσουμε.”

ΕΞΑΝΤΛΗΤΙΚΕΣ ΠΑΡΕΜΒΑΣΕΙΣ ΣΤΙΣ ΜΕΘ - ΟΡΟΙ ΚΑΙ ΟΡΙΑ

ΠΑΡΑΤΑΣΗ ΖΩΗΣ Η ΠΑΡΕΜΠΟΔΙΣΗ ΘΑΝΑΤΟΥ;
Ἠθικοὶ προβληματισμοὶ

2013

Μητροπολίτου Μεσογαίας καὶ Λαυρεωτικῆς Νικολάου

6. Ἡ ἐνεργητικὴ εὐθανασία ἔχει τὰ χαρακτηριστικὰ τῆς σκληρότητος τοῦ φόνου. Καὶ ἡ λεγόμενη παθητικὴ ἔχει τὸ στοιχεῖο τῆς ἐγκατάλειψης. Ἡ Ἐκκλησία ἀντιτίθεται καὶ στὰ δυο. Ἐκεῖ ποὺ βλέπει τὴν ἀνάγκη νὰ συζητήσει εἶναι ἡ ἄρνηση ἢ διακοπὴ τῆς μὴ ἐπιθετικῆς θεραπευτικῆς. Γιατί ἐνίοτε αὐτὴ ἡ θεραπευτικὴ δὲν θεραπεύει ἀλλὰ βασανίζει δίχως λόγο καὶ παρεμποδίζει τὴν εὐλογία τοῦ θανάτου. Ἡ κρίση τοῦ πότε αὐτὸ συμβαίνει ἐπαφίεται στὴ συνείδηση τοῦ γιατροῦ. Γι᾽ αὐτὸ ἴσως ὁ ρόλος τῆς Ἐκκλησίας δὲν εἶναι νὰ δώσει ὁδηγίες γιὰ τὸ δίλημμα ἀλλὰ νὰ καλλιεργήσει τὶς συνειδήσεις.

Κώδικας Ιατρικής Δεοντολογίας

ΚΕΦΑΛΑΙΟ Θ’ - ΕΙΔΙΚΑ ΘΕΜΑΤΑ

Άρθρο 29. Ιατρικές αποφάσεις στο τέλος της ζωής

1. Ο ιατρός, σε περίπτωση ανίατης ασθένειας που βρίσκεται στο τελικό της στάδιο, ακόμη και αν εξαντληθούν όλα τα ιατρικά θεραπευτικά περιθώρια, οφείλει να φροντίζει για την ανακούφιση των ψυχοσωματικών πόνων του ασθενή. Του προσφέρει παρηγορητική αγωγή και συνεργάζεται με τους οικείους του ασθενή προς αυτήν την κατεύθυνση. Σε κάθε περίπτωση, συμπαρίσταται στον ασθενή μέχρι το τέλος της ζωής του και φροντίζει ώστε να διατηρεί την αξιοπρέπειά του μέχρι το σημείο αυτό.
2. Ο ιατρός λαμβάνει υπόψη τις επιθυμίες που είχε εκφράσει ο ασθενής, ακόμη και αν, κατά το χρόνο της επέμβασης, ο ασθενής δεν είναι σε θέση να τις επαναλάβει.
3. Ο ιατρός οφείλει να γνωρίζει ότι η επιθυμία ενός ασθενή να πεθάνει, όταν αυτός βρίσκεται στο τελευταίο στάδιο, δεν συνιστά νομική δικαιολόγηση για τη διενέργεια πράξεων οι οποίες στοχεύουν στην επίσπευση του θανάτου.

“Western Attitudes Toward Death” (I)

Aries P. ***Johns Hopkins University Press 1974***

- Ο θάνατος ήταν αποδεκτός χωρίς φόβο.
- Ο θάνατος δεν συντομεύονταν ούτε παρατείνονταν.
- Ο θάνατος ήταν κοινωνικό γεγονός και ελάμβανε χώρα παρουσία της οικογένειας, των φίλων, των γειτόνων και των παιδιών.
- Ο θνήσκων όχι μονο εγνώριζε αλλά και καθόριζε την σχετική τελετουργία.

“Western Attitudes Toward Death” (II)

Aries P. ***Johns Hopkins University Press 1974***

- Η στάση του Δυτικού κόσμου απέναντι στο θάνατο άλλαξε από κάτι κοινό, φυσικό και αναμενόμενο, σε κάτι ντροπιαστικό και απαγορευμένο.
- Οι άνθρωποι δεν πεθαίνουν πια στο σπίτι τους, αλλά στο νοσοκομείο ή στο γηροκομείο.
- Ο θάνατος λαμβάνει χώρα στο θάλαμο του νοσοκομείου και πολύ συχνά με τον θνήσκοντα μόνο.
- Ο θάνατος στη ΜΕΘ, συχνά είναι αποτέλεσμα περιορισμού ή διακοπής θεραπειών υποστήριξης ζωής

Death, Grief and Mourning
Gorer G. *New York: Anchor books 1967:192-199*

- ***Στο παρελθόν στα παιδιά διδάσκονταν ότι "έρχονται στον κόσμο από τον πελαργό", αλλα παρευρίσκονταν στην αποχαιρετιστήρια τελετουργία παρά την κλίνην του θνήσκοντος***
- ***Σήμερα στά παιδιά αποκαλύπτεται πολύ νωρίς η "φυσιολογία της ερωτικής πράξης", αλλά όταν φίλοι ή συγγενείς πεθαίνουν, τους δίνονται περίεργες και φανταστικές εξηγήσεις για την ερμηνεία του γεγονότος***

The problem

- Older adults with dementia or multimorbidity
- Advanced malignancy
- Severe or incurable neurologic conditions
- Resuscitations and cardiac arrest
- Organ failure

REASONS FOR ED PRESENTATION OF PATIENTS WITH KNOWN ADVANCED ILLNESS

- New or exacerbation of chronic symptoms
- Reduced performance status; worsening frailty
- Altered mentation (eg, delirium)
- Psychological distress
- Social problems (eg, lack of a caregiver, caregiver distress, poor coordination of care)
- Financial, employment, or housing concerns
- Questions about prognosis and treatment options

The magnitude

- For example, nursing home residents in the USA with advanced dementia had a doubling in use of mechanical ventilation between 2000 and 2013, without any substantial improvement in survival, and the US national health insurance programme, Medicare, spent nearly US$100 million on this high-intensity, low-value care in 2013.

End-of-Life Practices in European

Objectives: Να προσδιορίσει τη συχνότητα και τις πρακτικές που ακολουθούνται στις Ευρωπαϊκές ΜΕΘ (ομοιότητες και διαφορές)

Προοπτική μελέτη παρατήρησης
Διαδοχικοί ασθενείς της ΜΕΘ που πέθαναν ή είχαν περιορισμό θεραπείας

Charles L. Sprung, MD
Simon L. Cohen, MD
Peter Sjokvist, MD
Mario Baras, PhD
Hans-Henrik Bulow, MD
Seppo Hovilehto, MD
Didier Ledoux, MD
Anne Lippert, MD
Paulo Maia, MD

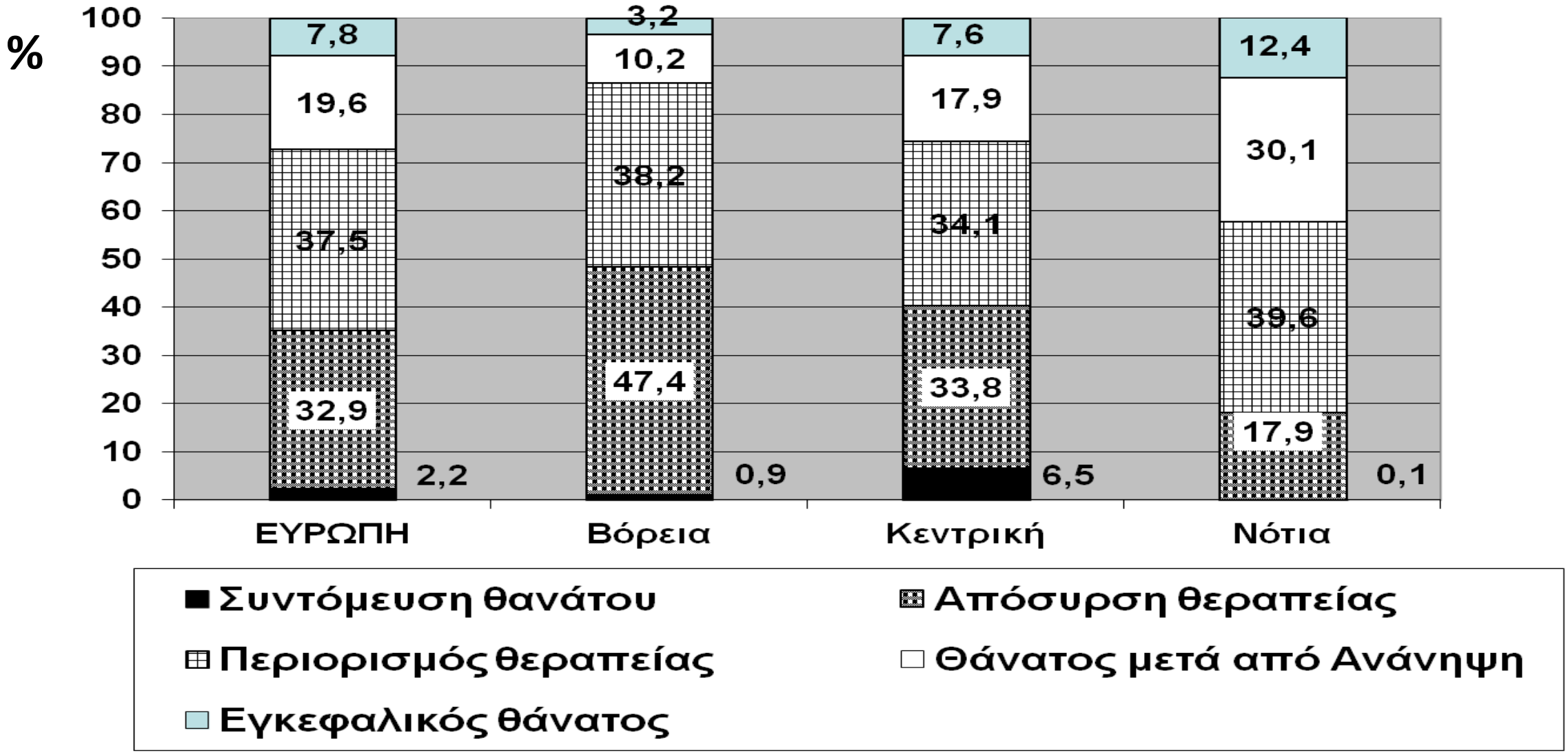
Objectives To
European intensi
Design and Setting A pr servational study of European ICUs.
Participants Consecutive patients who died or had any limitation of therapy.
Intervention spectively defined end-of-life practices in 37 ICUs in 17 European countri d from January 1, 1999, to June 30, 2000.
Comparison and analysis of the frequencies and pat- regions and different patients and professionals.
248 patients (13.5%) died or had a limi- nts (72.6%) had limitations of treat- riability was found in the limita- ary resuscitation in 20% (range, lding therapy in 38% (range, 9%), and active shortening of the dying process was reported

37 Ευρωπαϊκές ΜΕΘ
Ιανουάριος 1999 – Ιούνιος 2000
31417 εισαγωγές 3086 ασθενείς με περιορισμό θεραπείας
(10% των εισαγωγών
80% των θανάτων)

JAMA 2003
263(16): 2211-2215

ETHICUS: Αποτελέσματα (IV)

Σύγκριση Βόρειας – Κεντρικής – Νότιας Ευρώπης



Intensive Care Med (2007) 33:1732–1739
DOI 10.1007/s00134-007-0693-0

ORIGINAL

Charles L. Sprung
Paulo Maia
Hans-Henrik Bulow
Bara Ricou
Apostolos Armaganidis
Mario Baras
Elisabet Wennberg
Konrad Reinhart
Simon L. Cohen
Dietmar R. Fries
George Nakos
Lambertius G. Thijs
the Ethicus Study Group

The importance of religious affiliation and culture on end-of-life decisions in European intensive care units

Intensive Care Med (2008) 34:423–430
DOI 10.1007/s00134-007-0973-8

REVIEW

Hans-Henrik Bülow
Charles L. Sprung
Konrad Reinhart
Shirish Prayag
Bin Du
Apostolos Armaganidis
Fekri Abroug
Mitchell M. Levy

The world's major religions' points of view on end-of-life decisions in the intensive care unit

Attitudes towards euthanasia among Greek intensive care unit physicians and nurses

Georgios Kranidiotis, MD [a,*], Julia Ropa, RN [a], John Mprianas, RN [b], Theodoros Kyprianou, MD [c], Serafim Nanas, MD [a]

Heart & Lung 44 (2015) 260–263

ΕΡΩΤΗΣΗ		Γιατροί	Νοση-λευτές
Εγκρίνουν την ευθανασία ?		28%	26%
Αποδέχονται μη κλιμάκωση + απόσυρση εάν … ?		82%	73%
Σας ζητήθηκε ποτέ ευθανασία ?		38%	18%
Πώς να λαμβάνεται η απόφαση ? (= από κοινού)		82%	77%
Πρέπει να επιτραπεί νομοθετικά ?	ΝΑΙ	59%	66%
	ΟΧΙ	36%	21%
Θα το κάνατε αν ήταν νόμιμο ?	ΝΑΙ	20%	10%
	ΟΧΙ	49%	47%

Systolic pressure <65 mm Hg at least once, <90 mm Hg for >30 minutes, new or increase need of vasopressors or fluid bolus >15 mL/kg), severe hypoxemia (peripheral oxygen saturation <80%) or cardiac arrest

Cardiovascular instability, observed in 42.6% of all patients undergoing emergency intubation, followed by severe hypoxemia (9.3%) and cardiac arrest (3.1%). Overall ICU mortality was 32.8%.

Rusoto et al, JAMA 2021;325(12):1164-1172.

The solution?

- The Institute of Medicine identifies patient-centered care as one of the foundations of high-quality health care.
- The emphasis on patient-centered care has made shared decision-making the communication paradigm for most medical treatments.
- Successful shared decision making requires three key components: identifying patient preferences, clearly explaining important medical information, and developing consensus around a treatment plan

Available online at www.sciencedirect.com

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

European Resuscitation Council Guidelines 2021: Ethics of resuscitation and end of life decisions

Spyros D. Mentzelopoulos[a,], Keith Couper[b,c], Patrick Van de Voorde[d,e], Patrick Druwé[f], Marieke Blom[g], Gavin D. Perkins[b], Ileana Lulic[h], Jana Djakow[i,j], Violetta Raffay[k,l], Gisela Lilja[m], Leo Bossaert[n]*

ETHICS GL 2021

5 TOP MESSAGES

EUROPEAN RESUSCITATION COUNCIL

1. ADVANCE CARE PLANS

- Help patients and families achieve the outcomes which are important for them
- Allow clinicians and patients to participate in shared decision making
- Should integrate DNACPR decisions with emergency care treatment plans

2. EDUCATE PATIENTS AND THE PUBLIC

- What resuscitation involves and outcomes following resuscitation
- About their role in helping clinicians know about the outcomes which are important to them

3. EDUCATE HEALTHCARE PROFESSIONALS

- About the importance of advanced care planning
- What shared decision making involves
- How to communicate effectively with patients and their relatives when discussing advanced care plans

4. WHEN TO START AND STOP RESUSCITATION

- Use pre-defined criteria for withholding or terminating CPR
- Do not base decisions on isolated clinical signs or markers of poor prognosis
- Document reasons for resuscitation decisions

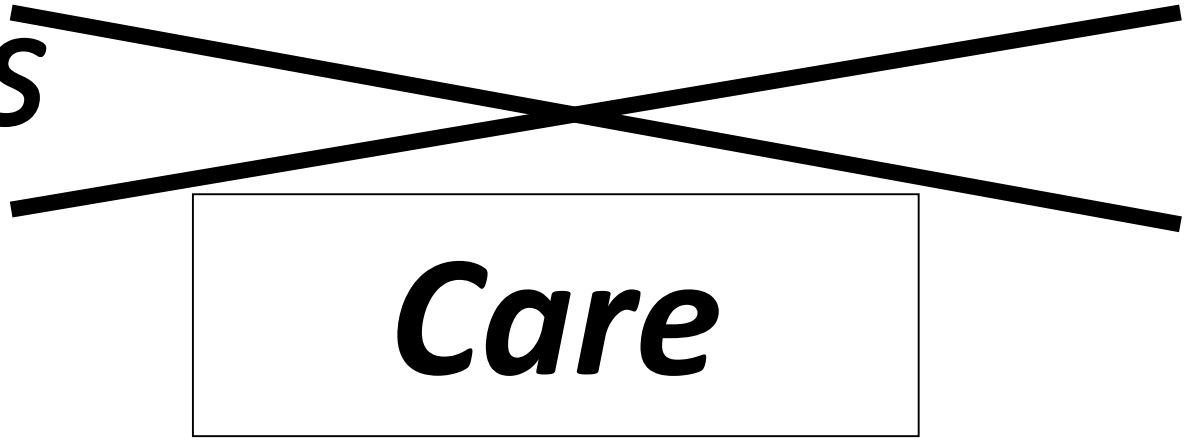
5. RESEARCH

- Involve patients and public during the design, conduct and interpretation of research
- Respect the dignity and privacy of research participants
- Follow national guidelines for conducting research in an emergency where the person lacks capacity

E O L D

End of Life

Decisions



«Ανώδυνα, Ανεπαίσχυντα, Ειρηνικά»

ABCDs for CPR

A = Airway

B = Breathing

C = Circulation

D = Disability.

ABCDs of Dignity-Conserving Care

A = Attitudes

B = Behavior

C = Compassion

D = Dialogue

Cook D., Rocker G 2014, NEJM 370: 2506-14

Table 1. Examples of the ABCDs of Dignity-Conserving Care.*

Attitudes and assumptions can affect practice.
Reflect on how your own life experiences affect the way in which you provide care.
Be aware that other clinicians' attitudes and assumptions can affect their approach to patients.
Teach learners to be mindful of how their perspectives and presumptions can shape behaviors.
Behaviors should always enhance patient dignity.
Demonstrate with nonverbal methods how patients and their families are important to you.
Do not rush; sit down and make eye contact when talking with patients and their families.
Turn off digital devices and avoid jargon when talking with patients and their families.
Compassion is sensitivity to the suffering of another and the desire to relieve it.
Elicit the personal stories that accompany your patient's illness.
Acknowledge the effect of sickness on your patient's broader life experience.
Recognize and relieve suffering.
Dialogue should acknowledge personhood beyond the illness.
Explore the values that are most important to your patients.
Ask who else should be involved to help your patients through difficult times.
Encourage patients and their families to reflect and reminisce.

COVID

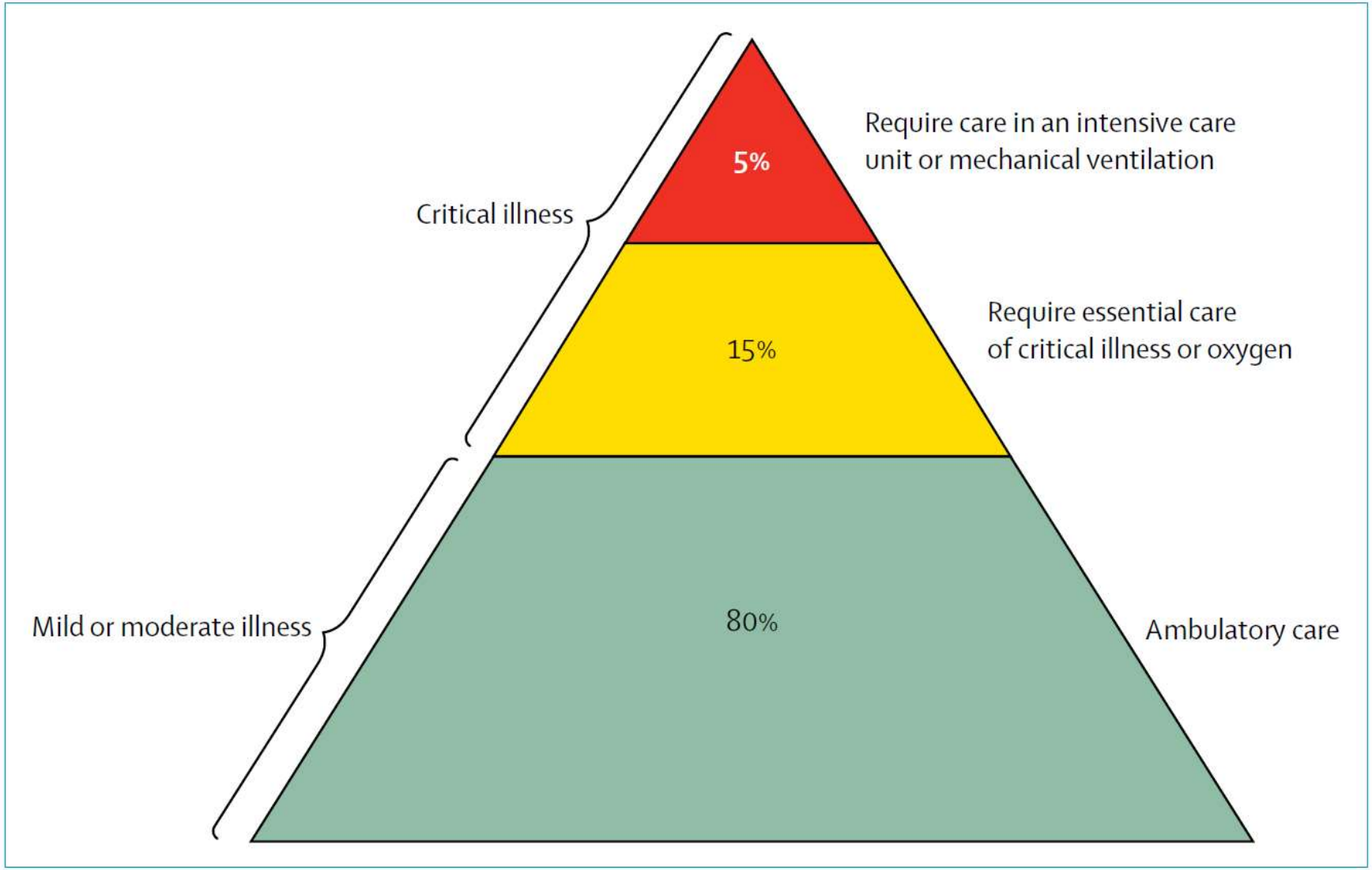
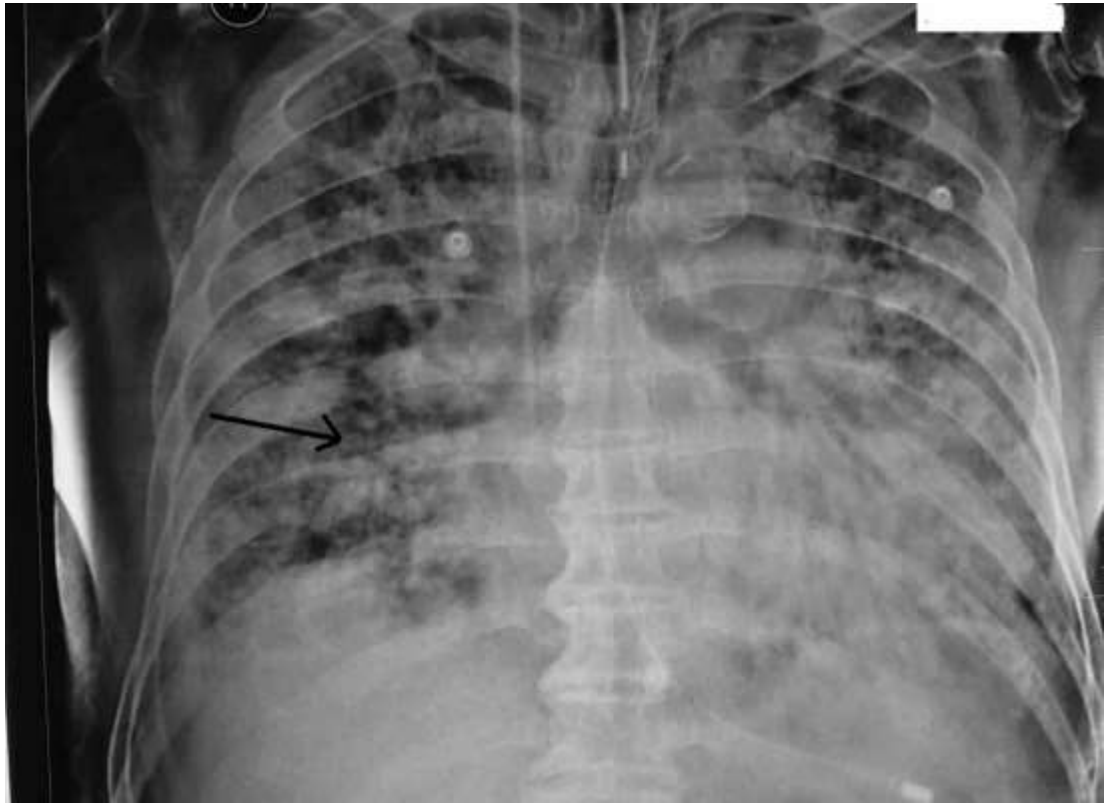


Figure: **Severity profile of coronavirus disease 2019**
Data source: Wu et al (2020).[1]

Published Online April 1, 2020 https://doi.org/10.1016/ S0140-6736(20)30793-5

Covid-19-Severe ARDS

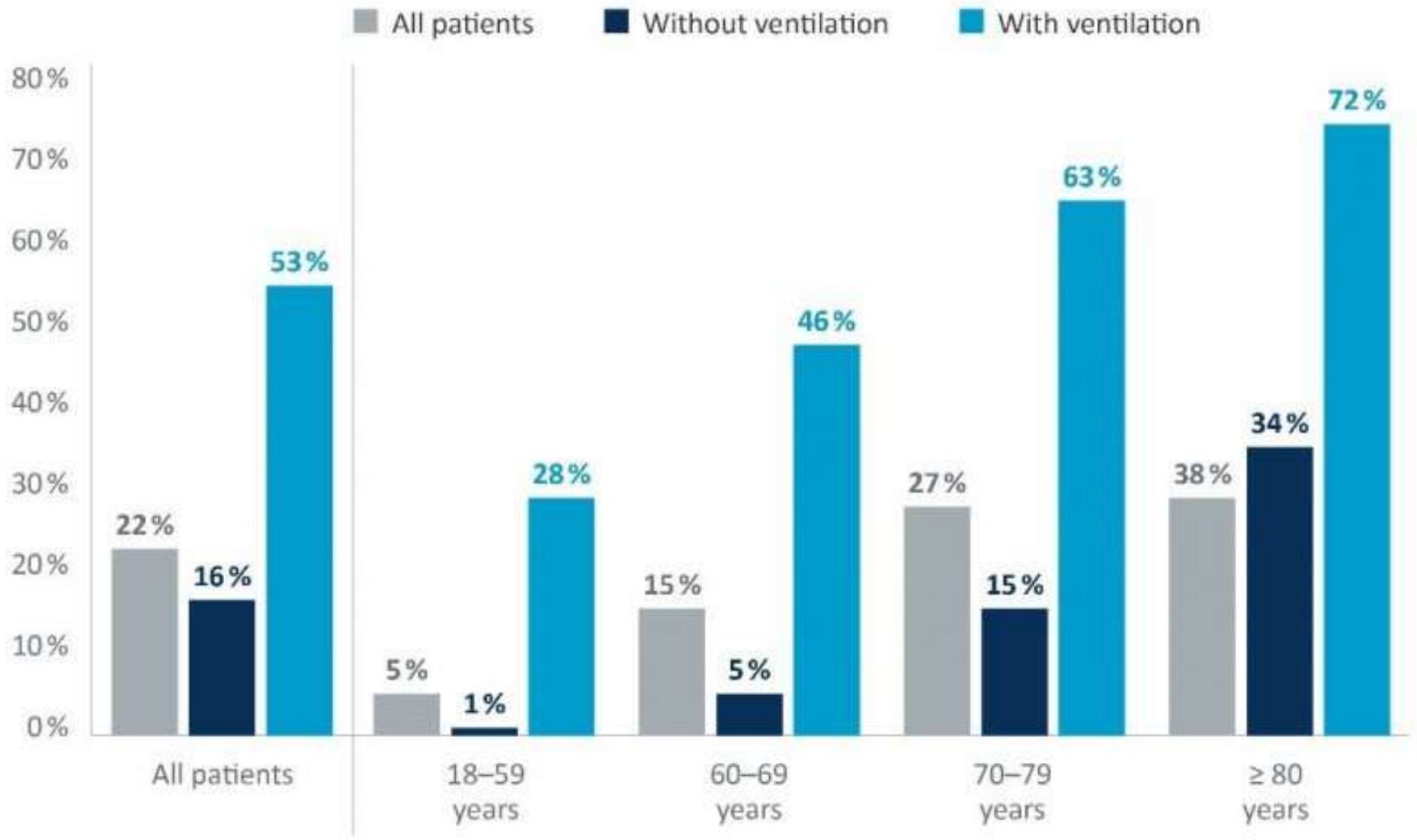


Covid-19: Mortality in the ICU

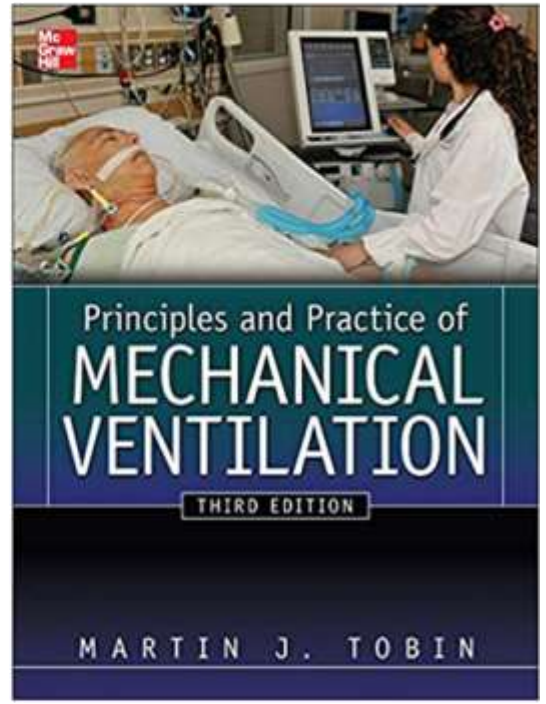
Study	Patients	DIED	ICU CARE	ICU on IMV	ICU died	Died on MV	Remained on MV
JAMA *doi:10.1001/jama.2020.6775*	2634	553	373	320	282/320 **(88.1%)**	282/320 **(88.1%)**	
Lancet *2020; 395: 1054–62*	191	54	50 (26%)		39/50 **(72%)**		
JAMA Intern Med. *doi:10.1001/jamainternmed.2020.0994*	201		53 (ARDS)	?	44/53 **(83%)**		
JAMA *doi:10.1001/jama.2020.4326*	21		20 (ARDS)	15	11/21 **(53%)**	?	8
N Engl J Med *2020;382:2012-22.*	24	12	16		12/24 **(50%)**		3
Crit Care Med *10.1097/CCM.0000000000004457*	217	67	217	165	67/217 **(31%)**	59/165 **36%**	8
Intensive Care Med 2020 Aug 20:1–10 doi: *10.1007/s00134-020-06211-2*	733			307	394/733 **(54%)**	248/307 **(80%)**	6

Case characteristics, resource use, and outcomes of 10 021 patients with COVID-19 admitted to 920 German hospitals: an observational study

Lancet Respir Med 2020 Published Online July 28, 2020 https://doi.org/10.1016/



«The decision to insert an endotracheal tube is one of the most difficult faced by an intensivist, and I continue to find this a formidable.»

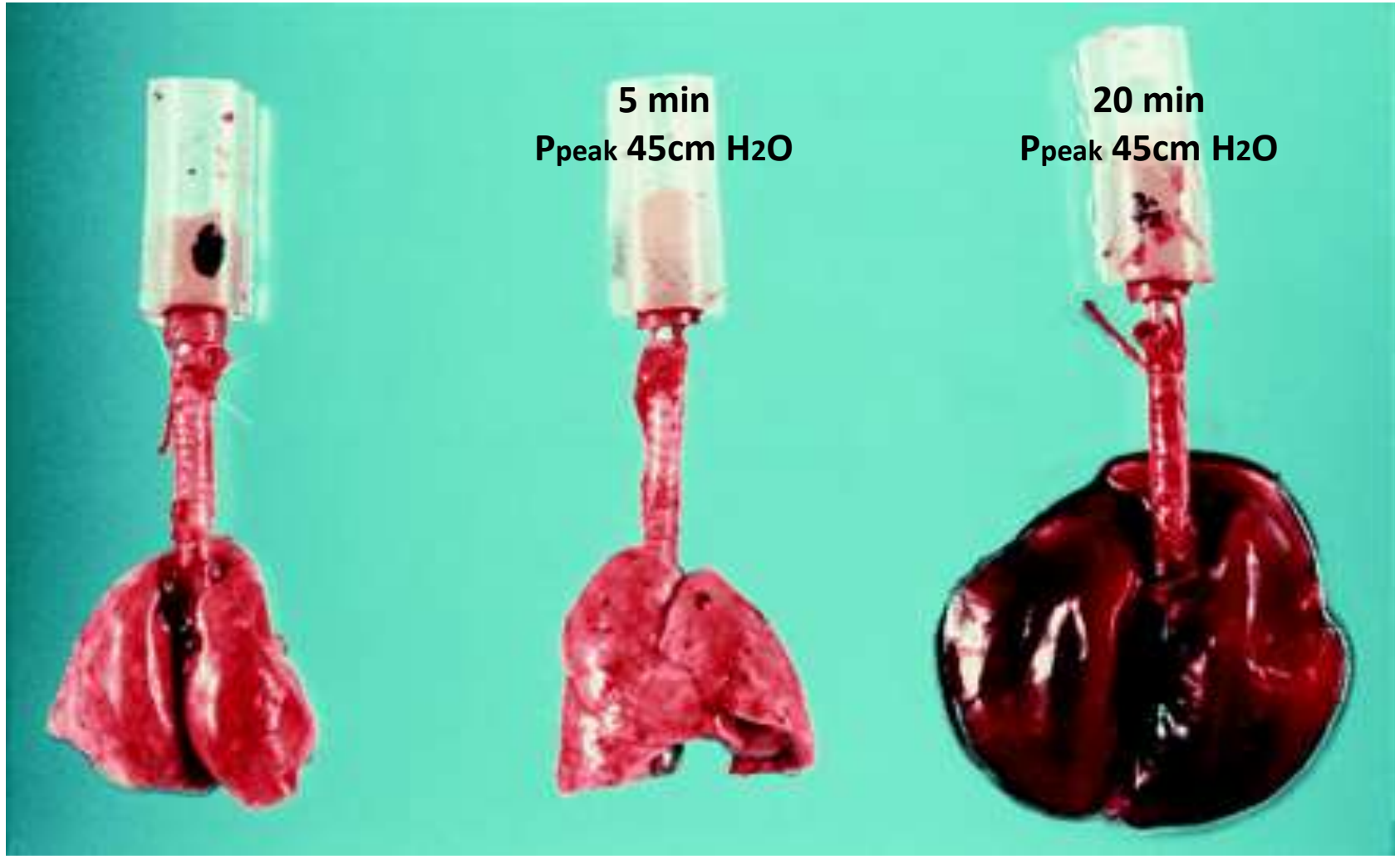


Can J Anesth/J Can Anesth (2021) 68:258–259

Επιπλοκές του μηχανικού αερισμού με θετική πίεση

- Τραχειοσωλήνας
  - Απόφραξη, αποσύνδεση
  - Κακή τοποθέτηση
  - Τραυματισμός λάρυγγα, στενώσεις
  - Επιμόλυνση (biofilm)
- Πνεύμονες
  - Ventilator associated pneumonia, VAP
  - Ventilator induced lung injury, VILI
  - Ασυγχρονία αυτόματης/μηχανικής αναπνοής
- Κυκλοφορία
  - Ελάττωση προφόρτιου
  - Ελάττωση καρδιακής παροχής
  - Ελάττωση σπλαχνικής αιματιοκής ροής
  - Κατακράτηση H_2O
  - Αυξηση ICP (PEEP)
- Άλλες
  - Διάταση εντέρου, έλκη
  - Μυική αδυναμία από ατροφία
  - Διαταραχές ύπνου,
  - Παραλήρημα

Ventilator Induced Lung Injury, VILI



Am J Respir Crit Care Med 1998, **157:** 1–30.

Intubation and PPV in patients with COVID-19

- Pathophysiological approach
  - criteria for intubation
- Bioethical approach
  - *whether someone should be ventilated*
    - Informed consent, ACP, medical futility
  - *who should be ventilated?*
    - Triage, utilitarian approach

Severe Covid-19: Prior intubation!

- HFNO
- NPPV
- Awake (nonintubated) proning

Dilemmas in Covid-19 Respiratory Distress: Early vs Late Intubation; High Tidal Volume and Low PEEP vs Traditional Approach?

Simran Kaur Matta*

Intensivist, Bayhealth Sussex Hospital, Milford 19963, Delaware, USA

J Intensive & Crit Care 2020; Vol.6 No.2:7

High-Flow, Noninvasive Ventilation and Awake (Nonintubation) Proning in Patients With Coronavirus Disease 2019 With Respiratory Failure

Suhail Raoof, MD, Master FCCP; Stefano Nava, MD; Charles Carpati, MD; and Nicholas S. Hill, MD

CHEST

The concerns about *aerosol dispersion* have led to calls for early intubation leading many hospitals to discourage use of noninvasive modalities.

Nava et al CHEST, 2020

Staff safety during emergency airway management for COVID-19 in Hong Kong

specialised in the procedure, and early intubation should be considered in a patient with deteriorating respiratory condition. For all cases, backup airway plans should be ready.

We recommend avoiding bag mask endotracheal tube should be connected to the ventilator via a filter and a waveform capnography monitoring device, with ventilation only started after pilot balloon inflation is confirmed. The capnography monitor-

Severe Covid-19:

Early intubation!

Luciano Gattinoni

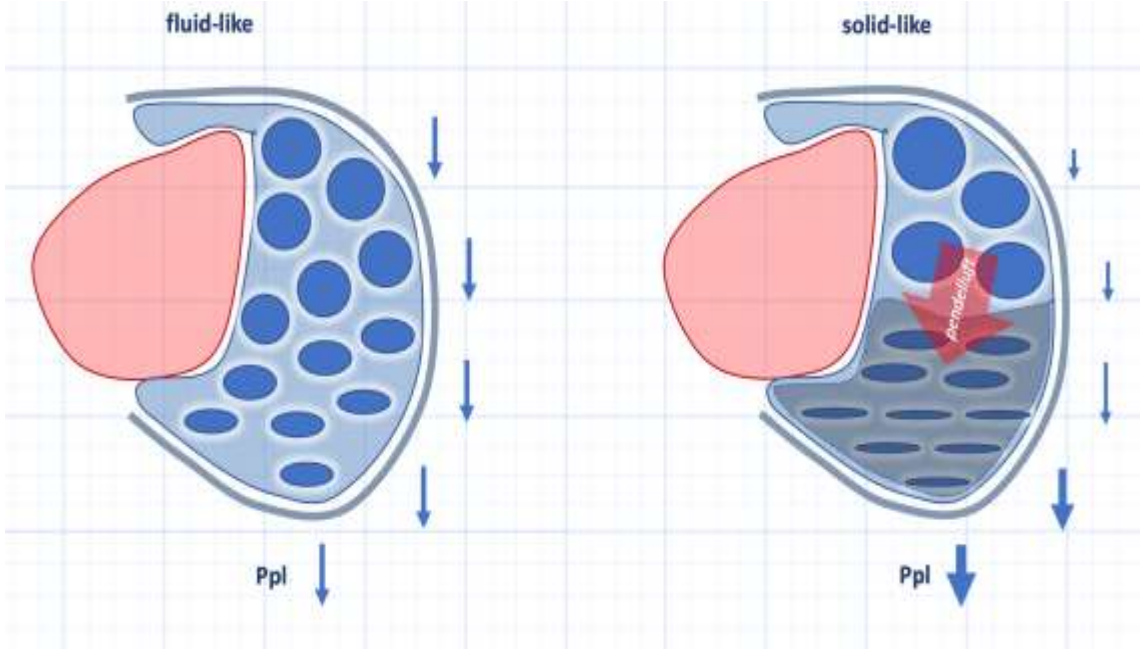
Noninvasive options are of
"questionable" value
"intubation should be prioritized",…
delayed intubation will cause a *P-SILI* vortex
that induces more severe ARDS

Intensive Care Med. 2020. https ://doi.org/10.1007/s0013 4-020-06033 -2.

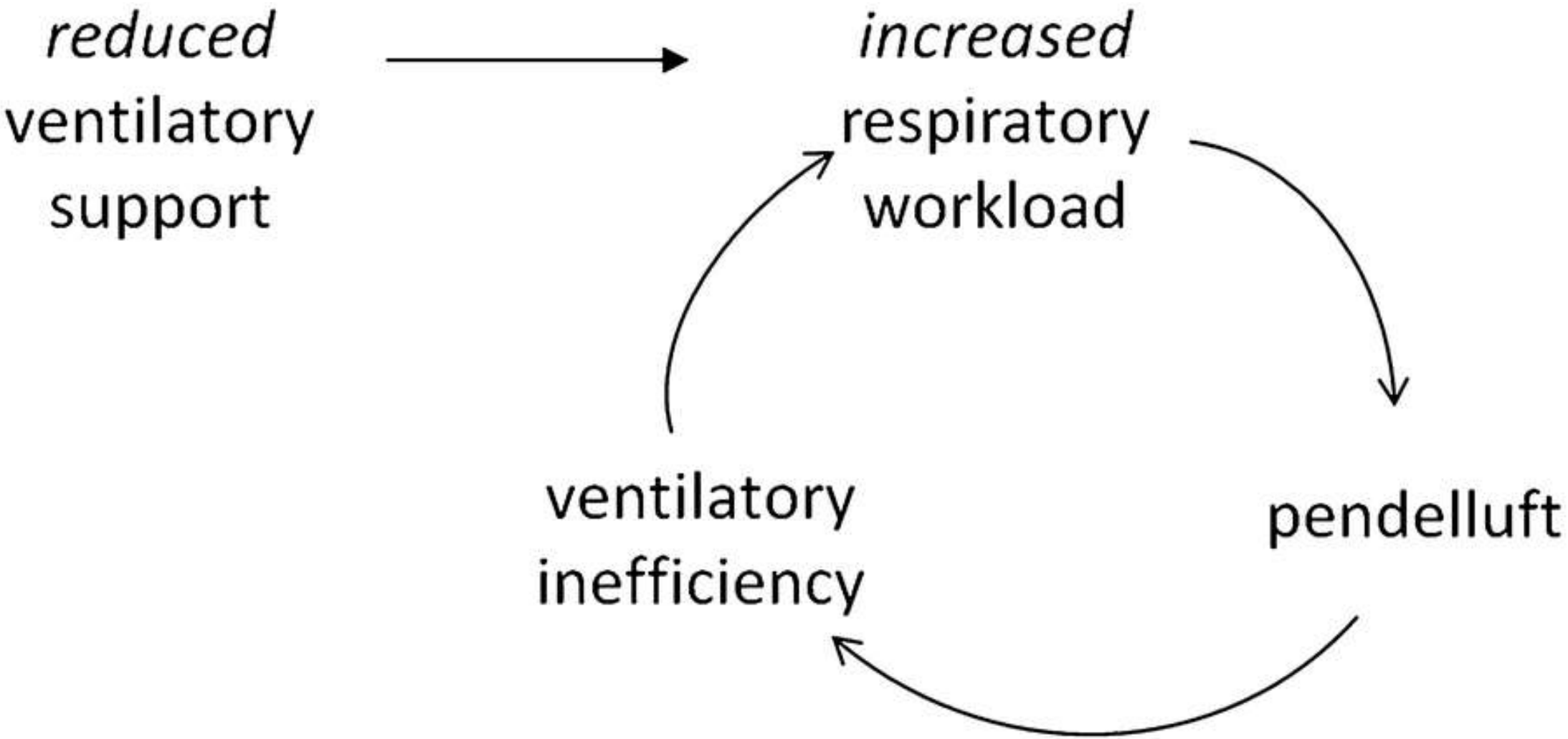
Am J Respir Crit Care Med. 2020. https ://doi.org/10.1164/rccm.20200 3-0817L E.

JAMA. 2020. https ://doi.org/10.1001/jama.2020.6825.

Patient Self-Inflicted Lung Injury (P-SILI)

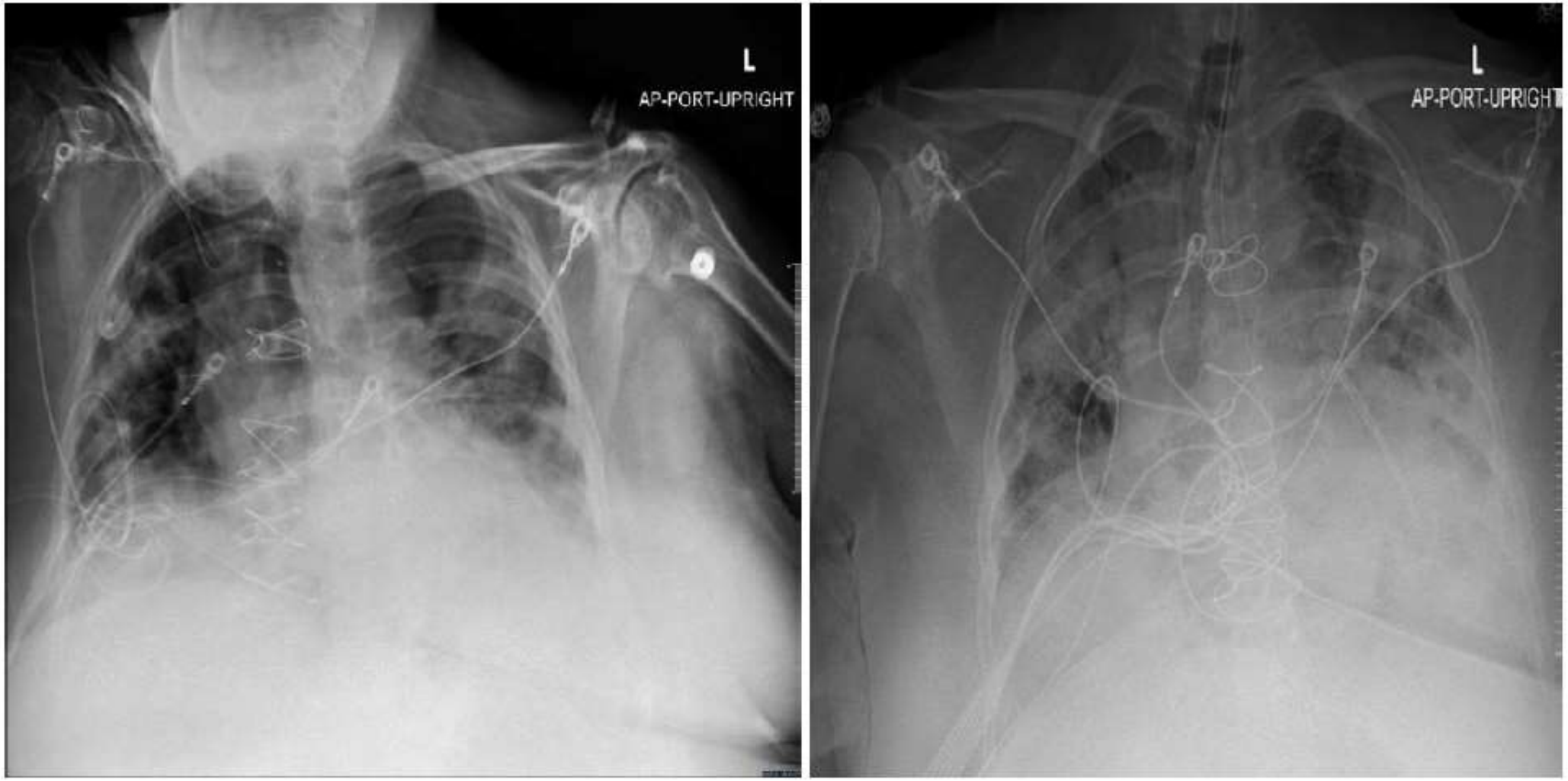


AJRCCM 2013, 188(12):1420-1427



Coppadoro et al. Ann. Intensive Care (2020) 10:39 https://doi.org/10.1186/s13613-020-00654

Worsening of infiltrates *over 5 hours during trial of NIPPV*; *possible role of P-SILI?*

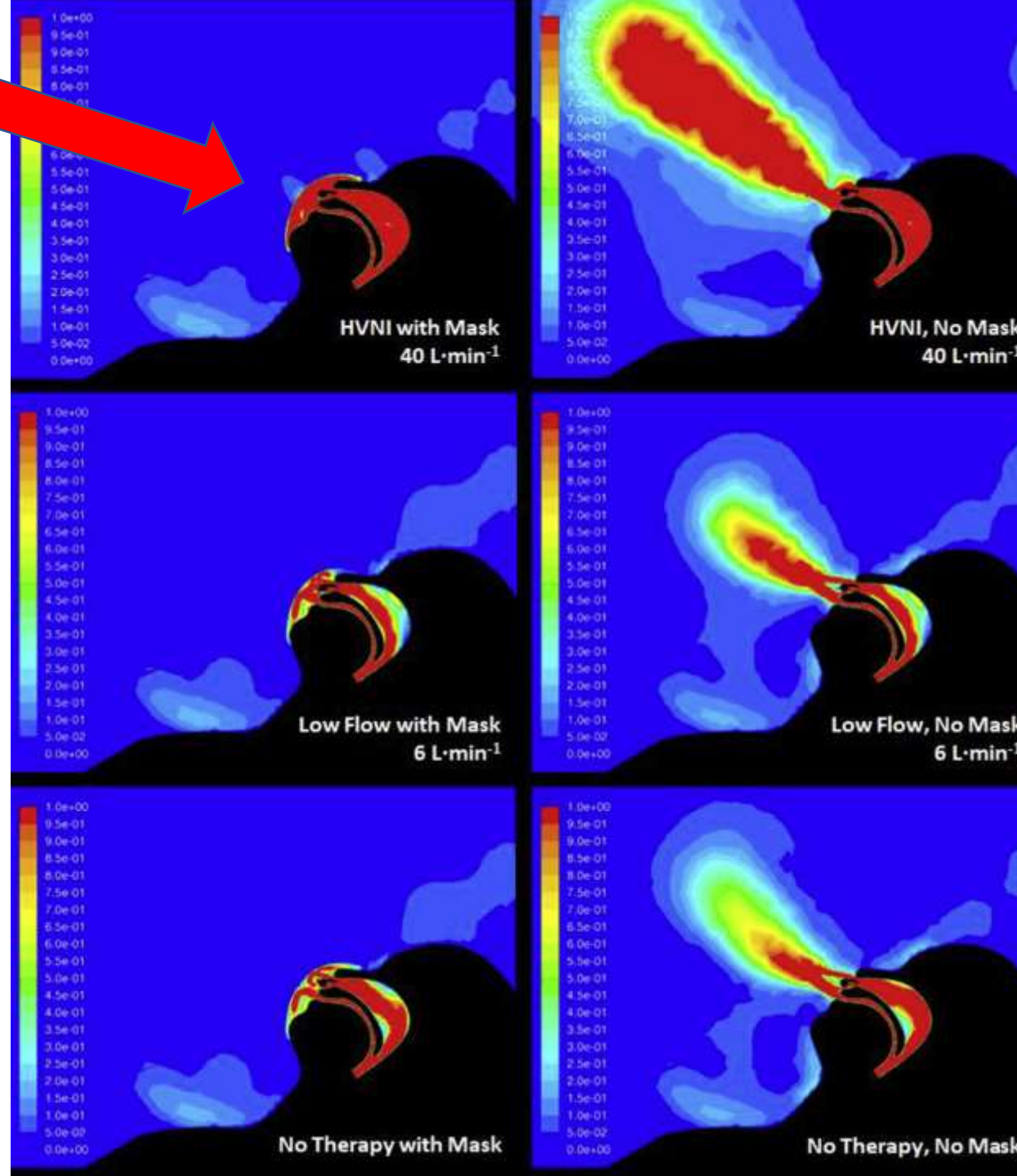


J Intensive & Crit Care 2020; Vol.6 No.2:7

Conditions	Flow rate L·min^{-1}	Dispersion distance of exhaled smoke at end-expiration cm	Calculated velocity at 0.5 s after start expiration m·s^{-1}	Estimated dispersion range of large droplets# cm
Normal breathing		36.3	0.46	18.5
HFNC				
Small cannula	30	71.2	0.65	26.2
Small cannula	60	72.1	0.83	33.4
Medium cannula	30	33.9	0.64	25.5
Medium cannula	60	48.5	0.63	25.4
Large cannula	30	25.4	0.47	18.8
Large cannula	60	73.3	0.72	28.8
Non-rebreather mask	15	20.3	0.38	15.1
Venturi mask				
F_{IO_2} 0.4	10	22.0	0.23	9.1
F_{IO_2} 0.6	15	33.7	0.26	10.3

Eur Respir J 2020; 56: 2003004 [https://doi.org/10.1183/13993003.03004-2020].

Velocity map of gas flow for all tested settings.
HVNI=high-velocity nasal insufflation.



[Critical Care Research Letter]

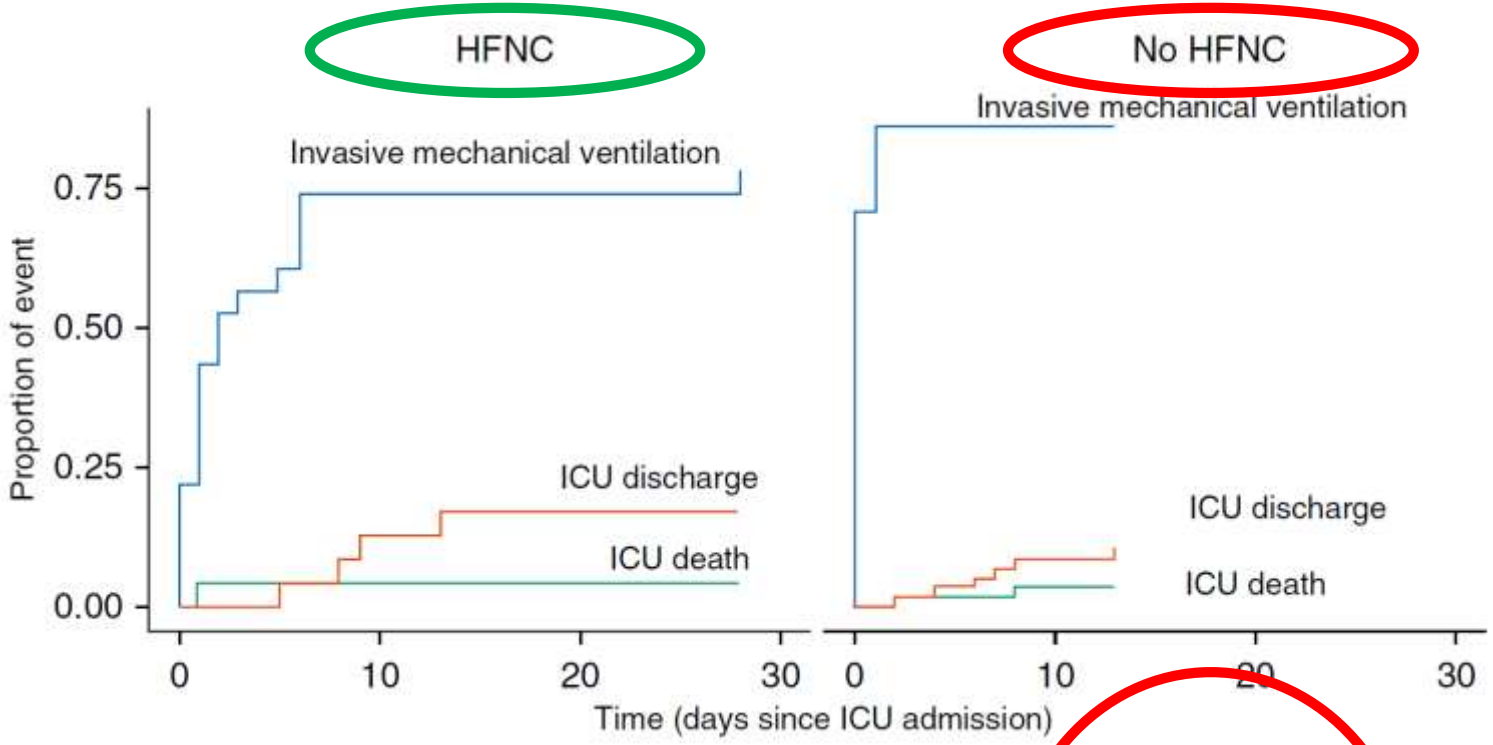
CHEST

Preliminary Findings on Control of Dispersion of Aerosols and Droplets During High-Velocity Nasal Insufflation Therapy Using a Simple Surgical Mask

Implications for the High-Flow Nasal Cannula

VOLUME 158, ISSUE 3
P1046-1049, SEPTEMBER 01, 2020

High-Flow Nasal Cannula in Critically Ill Patients with Severe COVID-19



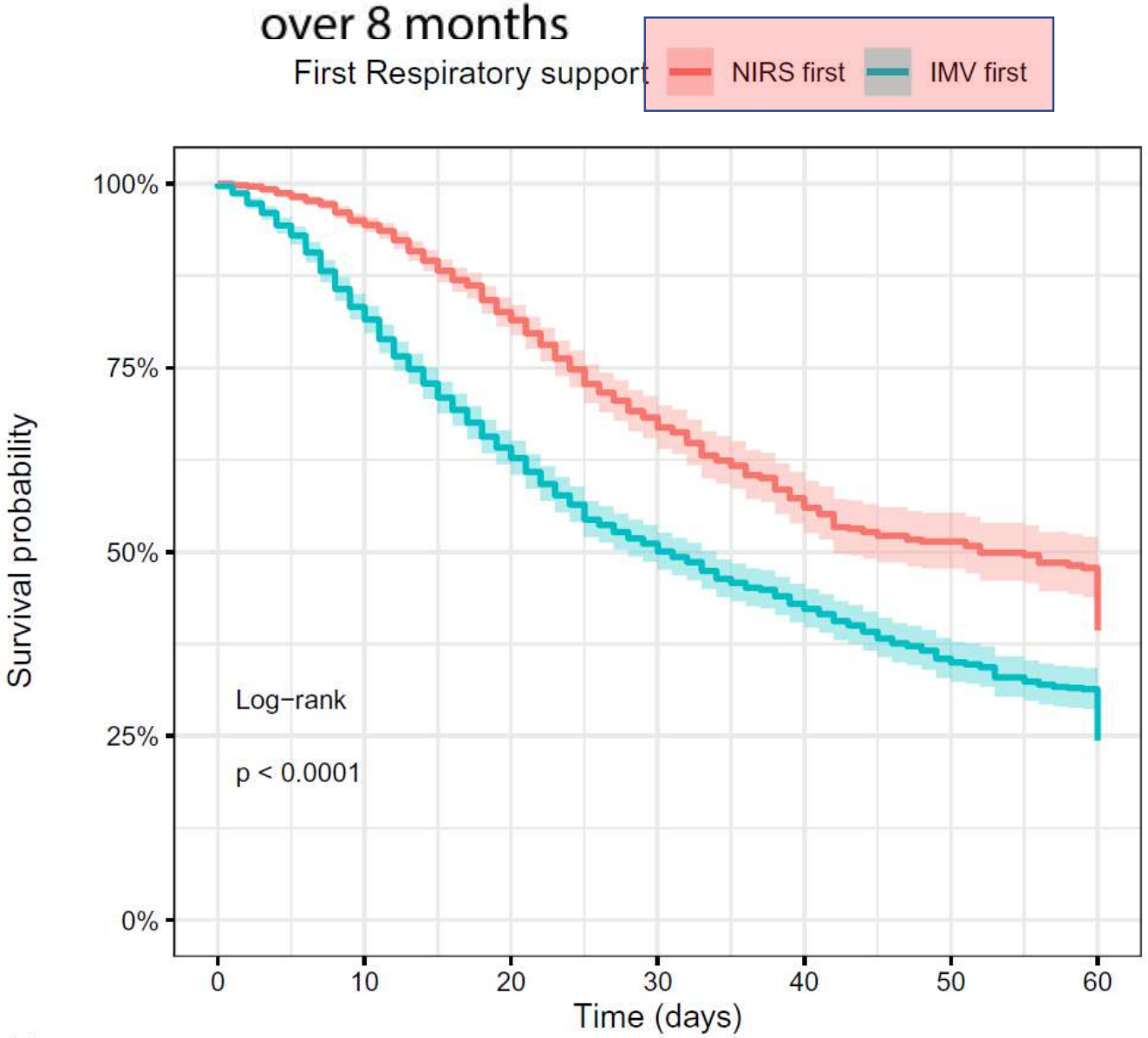
This retrospective study (379 pts) suggests that HFNC *significantly reduces* intubation and subsequent IMV but does not affect case fatality

Outcome variables	No HFNC (*n* = 233)	HFNC (*n* = 146)	*P* Value
Invasive mechanical ventilation at Day 28	175 (75)	82 (56)	<0.001
ICU mortality	68 (34)	30 (25)	0.117
Mortality at Day 28	70 (30)	30 (21)	0.055
Mortality at Day 60	72 (31)	31 (21)	0.052

Am J Respir Crit Care Med 2020 Oct 1;202(7):1039-1042.

ORIGINAL

Evolving changes in mortality of 13,301 critically ill adult patients with COVID-19 over 8 months



4188 pts respiratory support (non-invasive /invasive),

- 42% only IMV
- 37% only NIRS (NPPV or HFNC)
- 21% failed NIRS and were intubated.

After adjusting for organ dysfunction scores and premorbid conditions,

- younger age,
- absence of frailty
- use of NIRS as a first support strategy

were independently associated with improved survival (hazard ratio for NIRS first [95% confidence interval], 0.59 [0.54–0.65], p < 0.001)

Intensive Care Med (2021) 47:538–548
https://doi.org/10.1007/s00134-021-06388-0

Table 2 Characteristics and outcomes of critically ill patients stratified by advanced respiratory support

Characteristics	Total *n* = 4,188	NIRS only *n* = 1,558	NIRS failure n = 865	IMV n = 1,765
PaO_2/FiO_2 [*n* = 1,963]	170 (94, 279)	216 (89, 329)	142 (90, 233)	172 (101, 273)
Normal (> 300)	431 (22%)	139 (32%)	75 (15%)	217 (21%)
Mild (201–300)	385 (20%)	89 (21%)	91 (18%)	205 (20%)
Moderate (101–200)	621 (32%)	78 (18%)	191 (38%)	352 (34%)
Severe (≤ 100)	526 (27%)	125 (29%)	146 (29%)	255 (25%)
Non-invasive respiratory support				
Only NPPV	2061 (85%)	1356 (87%)	705 (82%)	-
Only HFNC	136 (5.6%)	87 (5.6%)	49 (5.7%)	-
Both	226 (9.3%)	115 (7.4%)	111 (13%)	-
ICU deaths, No. (%) [*n* = 13,294]	1329 (32%)	47 (3.0%)	398 (46%)	884 (50%)
In-hospital deaths, No. (%) [*n* = 13,219]	1572 (38%)	73 (4.7%)	457 (53%)	1042 (59%)

Intensive Care Med (2021) 47:538–548
https://doi.org/10.1007/s00134-021-06388-0

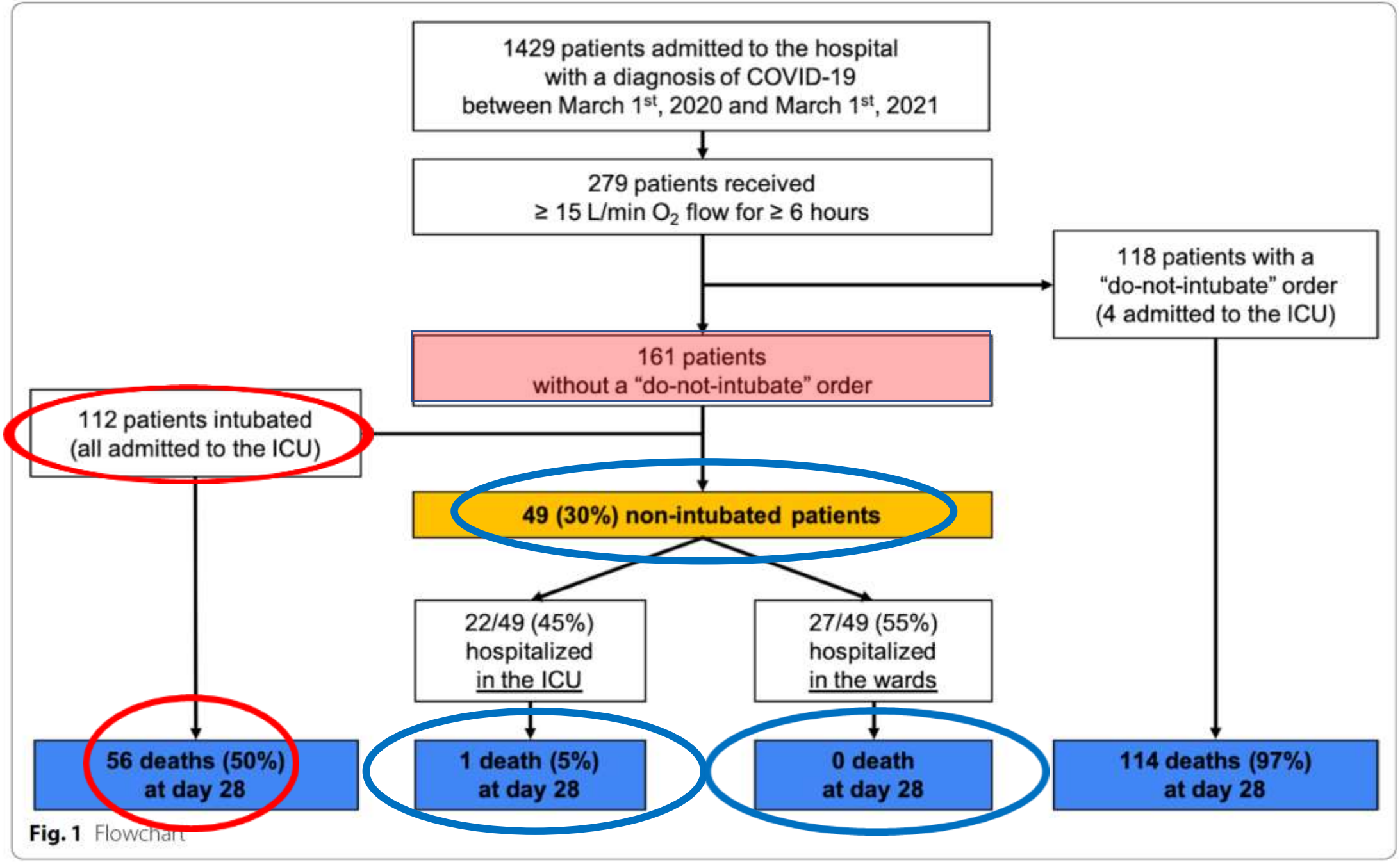
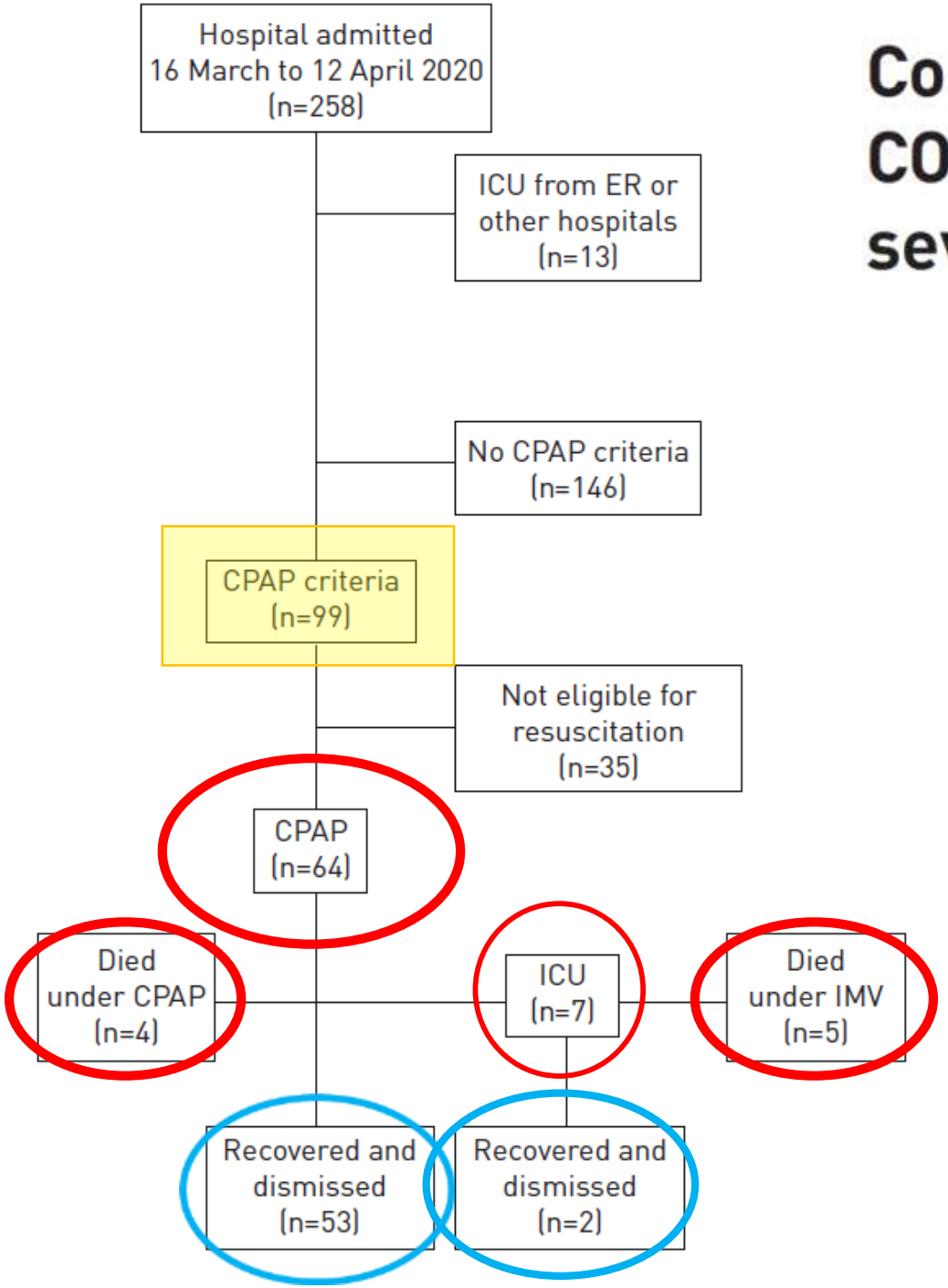


Fig. 1 Flowchart

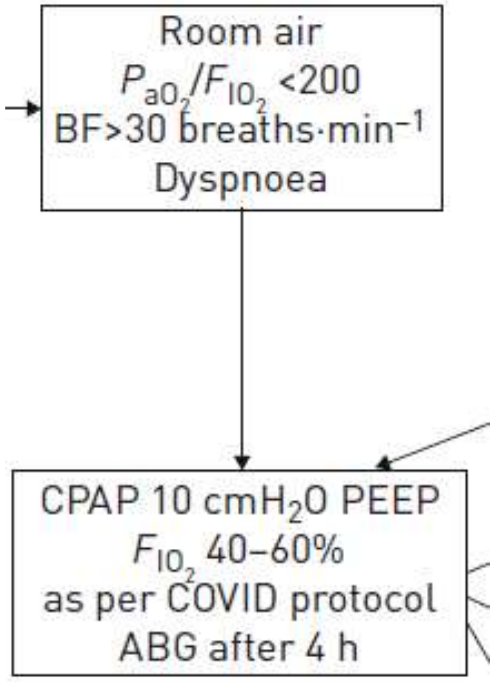
Chosidow et al. Crit Care (2021) 25:170 https://doi.org/10.1186/s13054-021-03599-1

Continuous positive airway pressure in COVID-19 patients with moderate-to-severe respiratory failure

Eur Respir J 2021; 57: 2002524 [https://doi.org/10.1183/13993003.02524-2020].



CPAP Criteria



Applying CPAP in Covid-19 patients with ARF

- Use of CPAP is a clinical art!
  - *An experienced physician enacts multiple and rapid adjustments*
- Each patient warrants individualized care!
  - *mental dulling? an astute clinician suspects a decrease in CO!*
  - *repeated ineffective efforts? Suspicion of intrinsic PEEP!*

When to intubate patients with severe ARF due to Covid-19?

TABLE 1. Criteria for the initiation of invasive mechanical ventilation

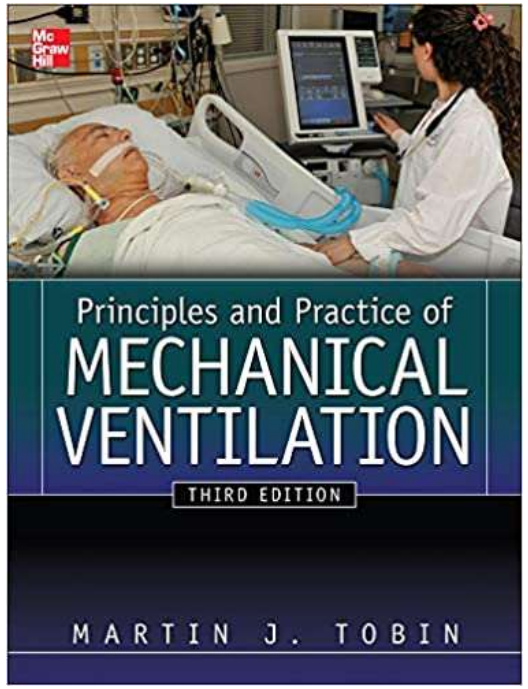
	Criteria for MV	Normal values
Breathing rate (/min)	>35	12-20
Vt (ml/Kg)	<5	5-7
PiMax (cm H_2O)	weaker than -25	-75 to -120
VC (ml/Kg)	<10	
VE (L/min)	<10	
Gas Exchange		
PaO_2 mmHg	<60 ($FiO_2 \geq 0.6$)	80-100 (21%)
PCO_2 mmHg	>60	35-45
A-a DO_2 mmHg	>350 ($FiO_2=1.0$)	25-65
Vd/Vt	>0.6	0.3-0.4

Vt=Tidal volume, Pimax=Maximal inspiratory pressure, VC=Vital capacity, VE=Ventilation

A-a DO_2=Alveolo-arterial oxygen difference, (Vd/Vt)=Dead space (Vd)/Tidal volume (Vt)

PNEUMON
Number 1, Vol. 33,
January - March 2020

When IMV should be instituted?



Our failure to formulate a list of indications does not mean that we advocate *a laissez-faire* approach to instituting IMV…….an algorithm cannot replace the presence of a physician well skilled in the art of clinical evaluation who has deep understanding the pathophysiologic principles

REVIEW Open Access

The pathophysiology of 'happy' hypoxemia in COVID-19

Sebastiaan Dhont[1*], Eric Derom[1,2], Eva Van Braeckel[1,2], Pieter Depuydt[1,3] and Bart N. Lambrecht[1,2,4]

Dhont *et al. Respiratory Research* (2020) 21:198
https://doi.org/10.1186/s12931-020-01462-5

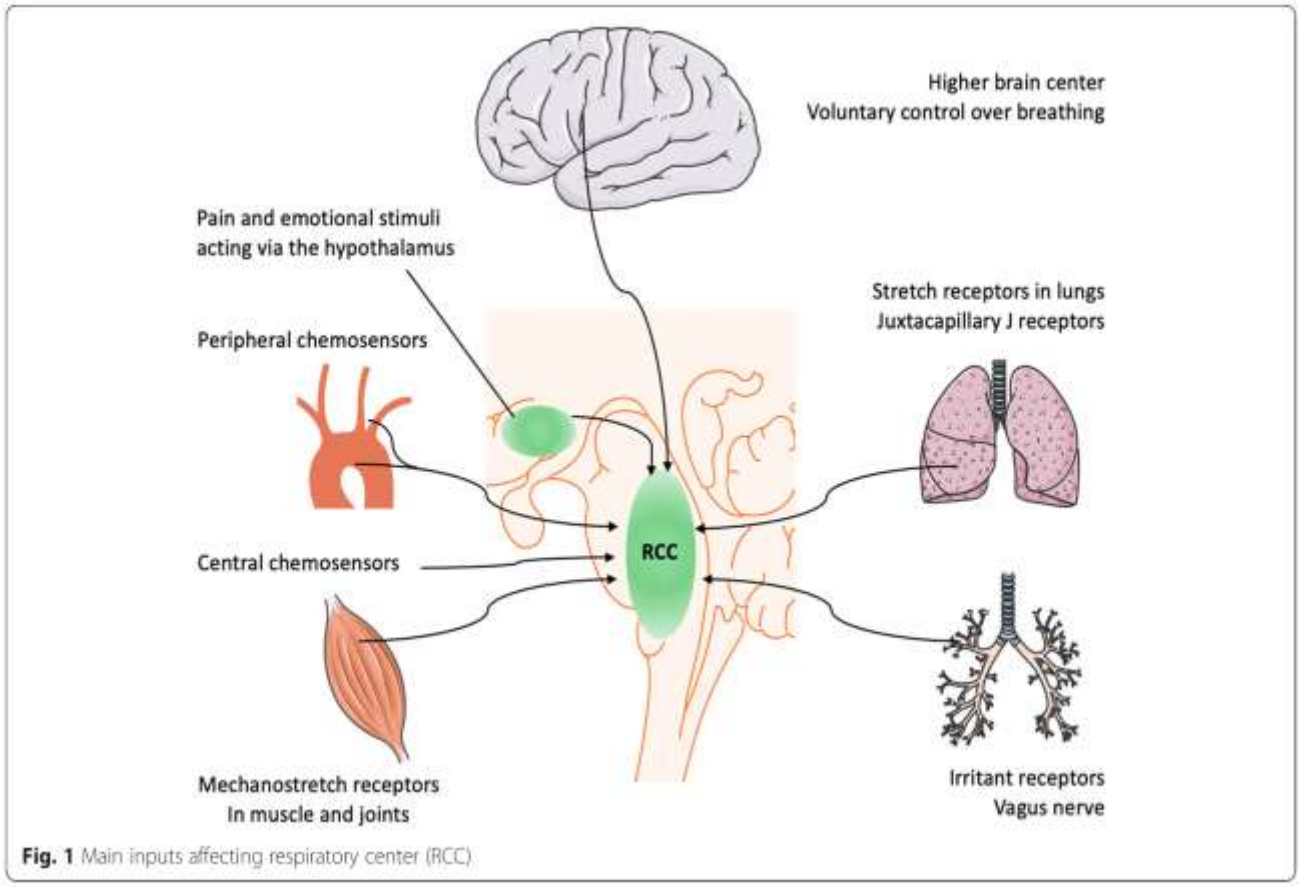


Fig. 1 Main inputs affecting respiratory center (RCC)

Work of Breathing↑

Silent Hypoxemia (PaO_2↓)

Intubation of Covid-19 patients

- Tachypnea
  - rarely the primary reason to intubate!
  - Incorrect to regard it as increased WOB!
- CXR infiltrates on their own *are not an indication for MV!*
- Hypoxemia
  - What is silent hypoxemia?
  - When go to anaerobic metabolism: $DO_2 \downarrow 25\%$

Am J Respir Crit Care Med Vol 201, Iss 11, pp 1319–1336, Jun 1, 2020

“Silent hypoxemia”

- The ventilatory response to hypoxia ↓ >50%
  - >65 years
  - diabetes
- The variation of chemical drive to breathe ~ 300–600%
- SpO_2 underestimated true SaO_2 by 4-7% (especially at SaO2<80%)
- Shifts in Oxygen Dissociation Curve (SaO2↓ as T↑)
- ACE_2 receptors (anosmia-hposmia, dyspnea?)
- PaO_2 and age (a PaO_2: 66 mm Hg can be normal in an 80-year-old man
- Definition of Hypoxemia
  - a patient on MV with ARDS in 100% O_2 and PaO_2 80 mm Hg is not hypoxemic but PaO2/FiO2: 80, <100!)

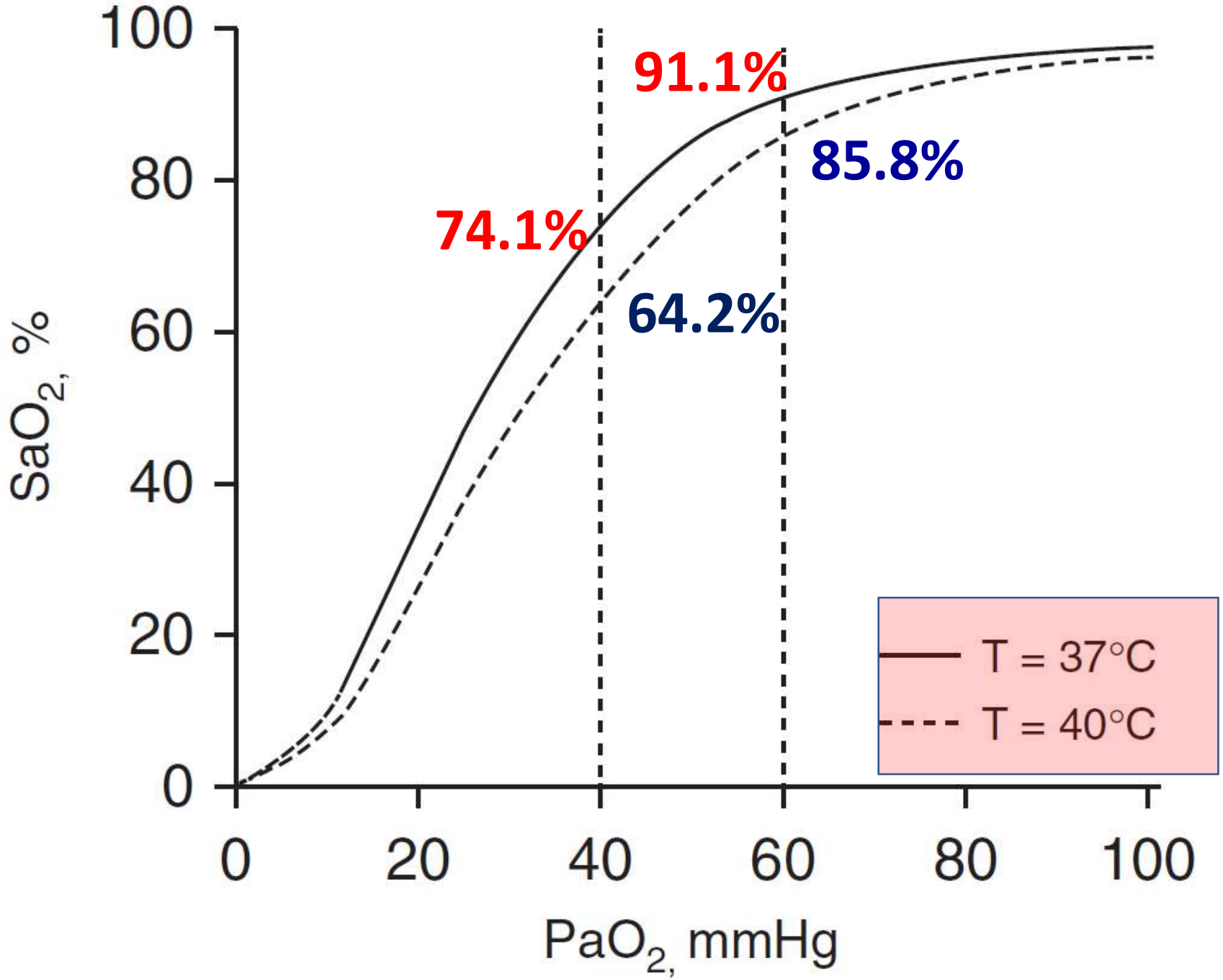
AJRCCM 202 (3): 356-360, August 1 2020

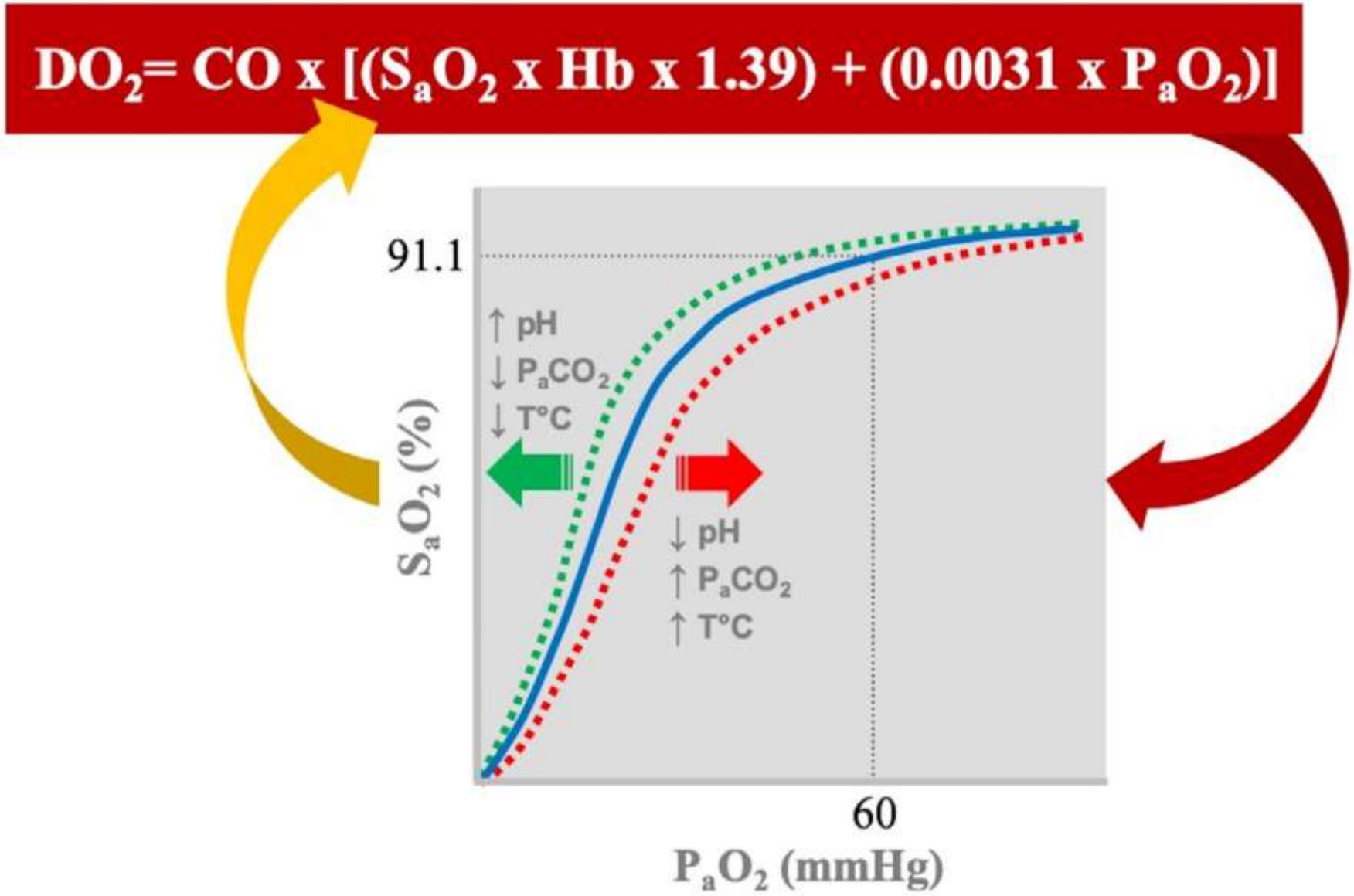
The New England
Journal of Medicine

Volume 330 MAY 12, 1994 Number 19

CHEMOSENSITIVITY AND PERCEPTION OF DYSPNEA IN PATIENTS WITH A HISTORY OF NEAR-FATAL ASTHMA

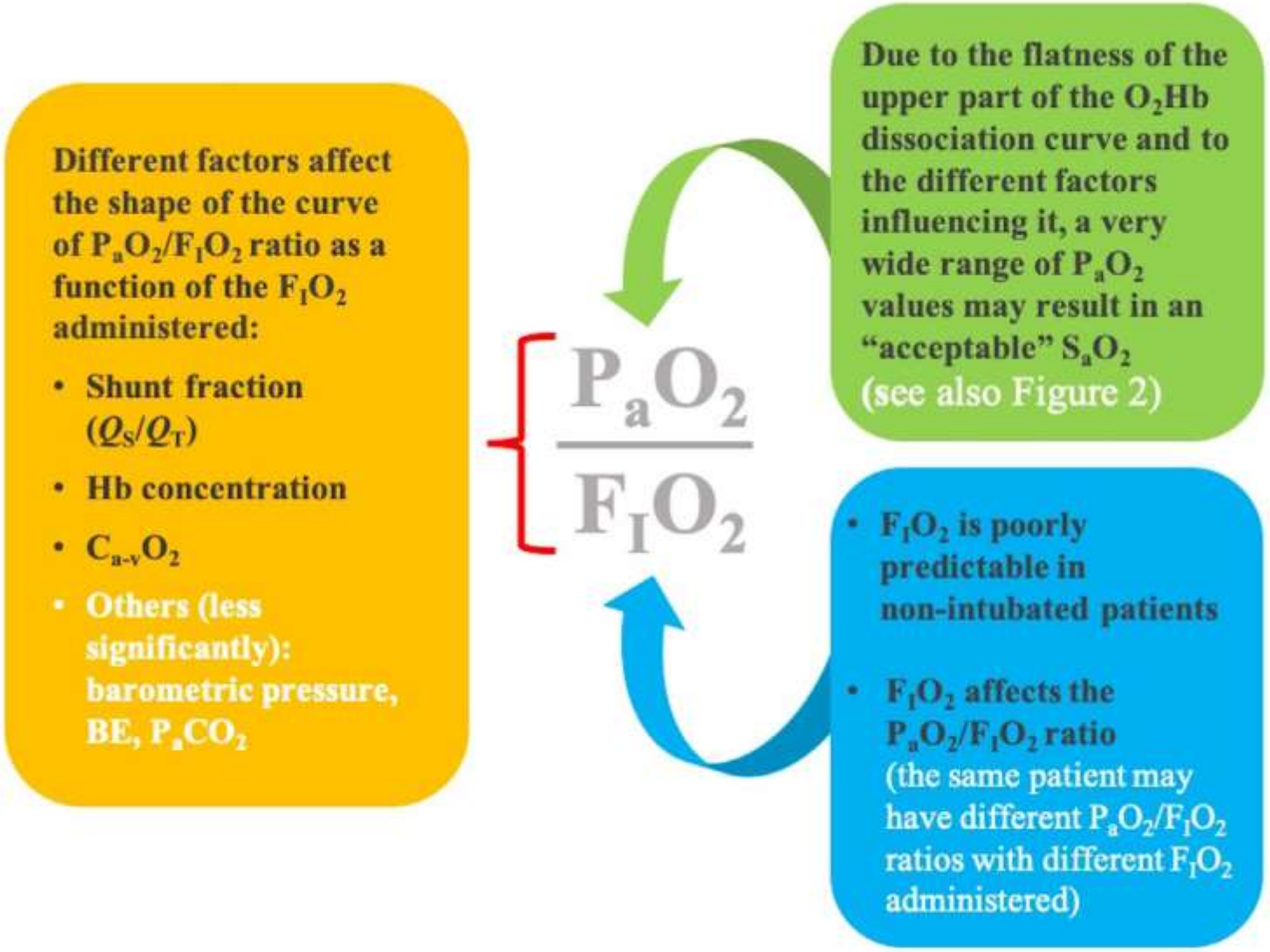
YOSHIHIRO KIKUCHI, M.D., PH.D., SHINICHI OKABE, M.D., PH.D., GEN TAMURA, M.D., PH.D., WATARU HIDA, M.D., PH.D., MASAAKI HOMMA, M.D., PH.D., KUNIO SHIRATO, M.D., PH.D., AND TAMOTSU TAKISHIMA, M.D., PH.D.


100
80
60
40
20
0
SaO_2, %
91.1%
85.8%
74.1%
64.2%
T = 37°C
T = 40°C
0
20
40
60
80
100
PaO_2, mmHg



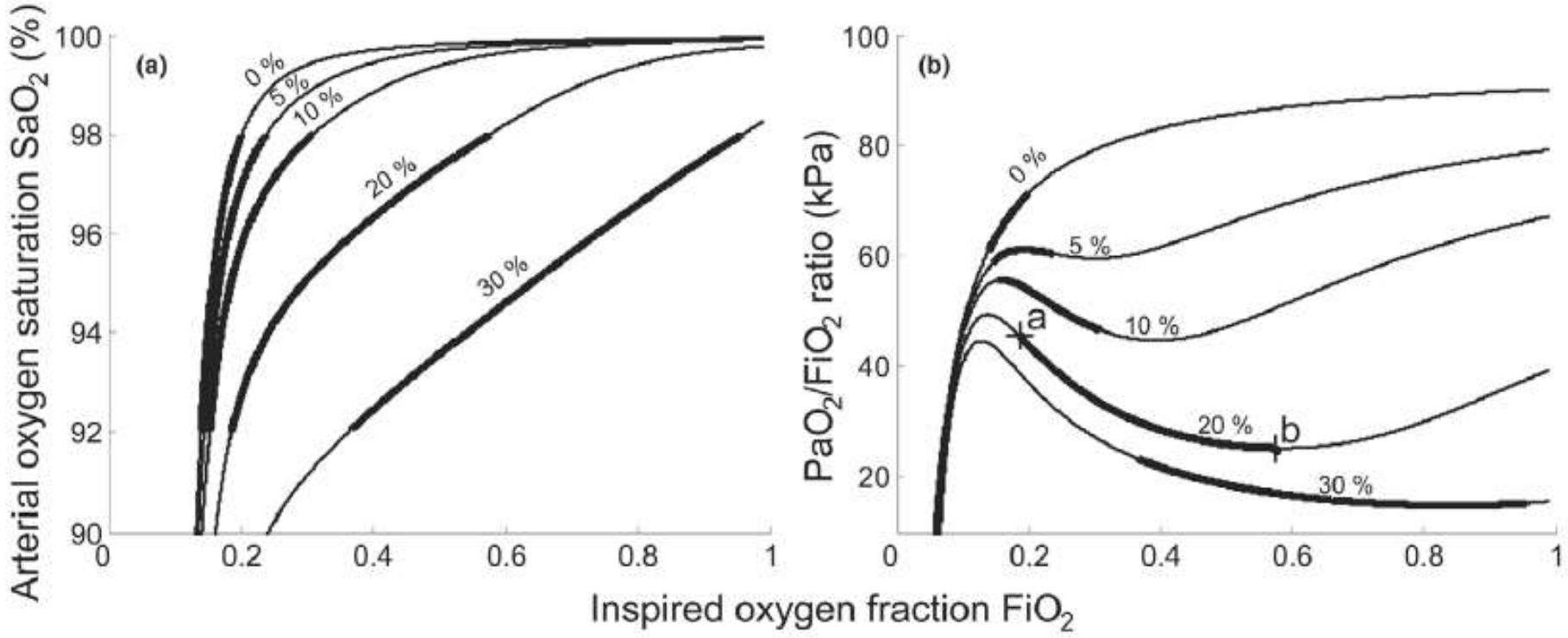
Journal of Cardiothoracic and Vascular Anesthesia 35 (2021) 12761280

The PaO_2/FiO_2 limitations



Journal of Cardiothoracic and Vascular Anesthesia 35 (2021) 12761280

The PaO_2/FiO_2 limitations



Model simulations of arterial oxygen saturation and arterial oxygen partial pressure/inspired oxygen fraction ratio. **(a)** Inspired oxygen fraction (FiO_2) versus arterial oxygen saturation (SaO_2). **(b)** FiO_2 versus the partial pressure of oxygen in arterial blood (PaO_2)/FiO_2 ratio. Simulations performed using shunt = 0–30%, parameter ΔPO_2 (fA2) = 0 kPa (0.9), oxygen consumption = 0.26 l/min, alveolar minute volume = 5.25 l. Points a and b, the PaO_2/FiO_2 ratios for FiO_2 = 0.19 (point a) and FiO_2 = 0.57 (point b) – corresponding to the extremes of the relevant range of FiO_2 (thick solid line).

Critical Care 2007, 11:R118 (doi:10.1186/cc6174)

When to intubate patients with severe ARF due to Covid-19?

CEEM Clinical and Experimental Emergency Medicine

Clin Exp Emerg Med 2020;7(2):78-80
https://doi.org/10.15441/ceem.20.043

Check for updates

eISSN: 2383-4625

Critical Care Corner

Rethinking the early intubation paradigm of COVID-19: time to change gears?

Philippe Rola[1], Joshua Farkas[2], Rory Spiegel[3], Cameron Kyle-Sidell[4], Scott Weingart[5], Laura Duggan[6], Marco Garrone[7], Adam Thomas[8]

Rethinking the early intubation paradigm of COVID-19: time to change gears?

Philippe Rola[1], Joshua Farkas[2], Rory Spiegel[3], Cameron Kyle-Sidell[4], Scott Weingart[5], Laura Duggan[6], Marco Garrone[7], Adam Thomas[8]

Clin Exp Emerg Med 2020;7(2):78-80
https://doi.org/10.15441/ceem.20.043

Table 1. Cabrini Respiratory Strain Scale

Parameter	Point[a)]
Respiratory rate	
<20	0
20–30	1
31–40	2
>40	4
Retraction/accessory muscle use	
None	0
Mild	1
Moderate	2
Severe	3
Overall state	
Relaxed	0
Uncomfortable	1
Anxious	2
Agitated	3

[a)]0–2, low; 3–5, moderate 6–10, high.

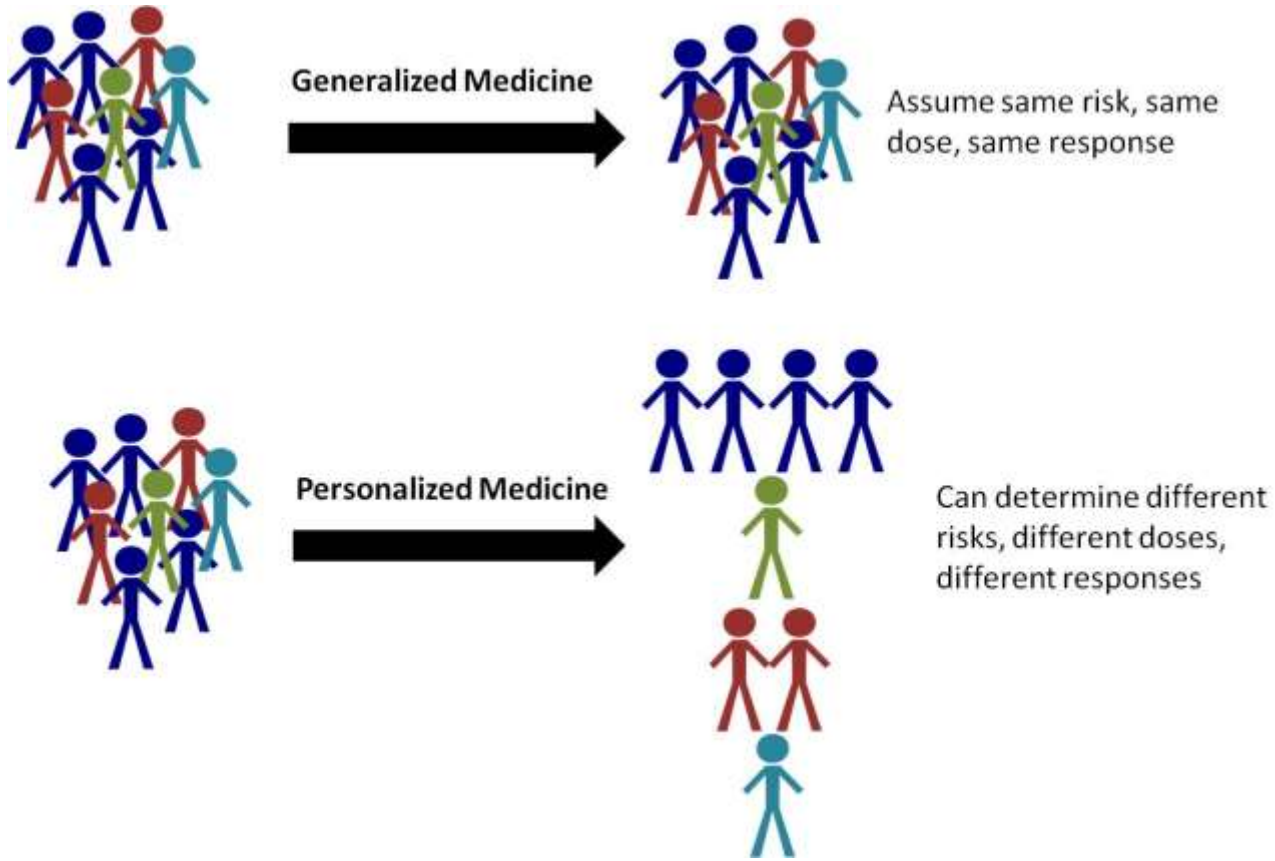
Indications for Tracheal Intubation in Patients With Coronavirus Disease 2019 (COVID-19)

Strong indications for tracheal intubation	Criteria probably do not justify by themselves tracheal intubation
• **Airway protection (alteration of consciousness)**	• Low PaO_2/FiO_2 ratio
• **Severe decompensated acidosis (pH < 7.2-7.25)**	• Prevention of clinical worsening
• **Severe absolute hypoxemia (PaO_2<50 mmHg or SaO_2<90%-92%)**	• Severity of chest CT findings
• **Signs and symptoms of distress or tissue hypoxia**	• Logistical, organizational or medicolegal considerations
• **Decision to implant VA-ECMO**	

Syndromes and Critical Care Medicine

- *Acute Respiratory Distress Syndrome*
- *Sepsis (syndrome)*
- *Acute Kidney Injury (syndrome)*
- *Multi-organ Dysfunction Syndrome*
- ……..

- *Post-intensive Care Syndrome*



Generalizability and Singularity

The Crossroads between Science and Clinical Practice

Am J Respir Crit Care Med Vol 189, Iss 7, pp 761–769, Apr 1, 2014

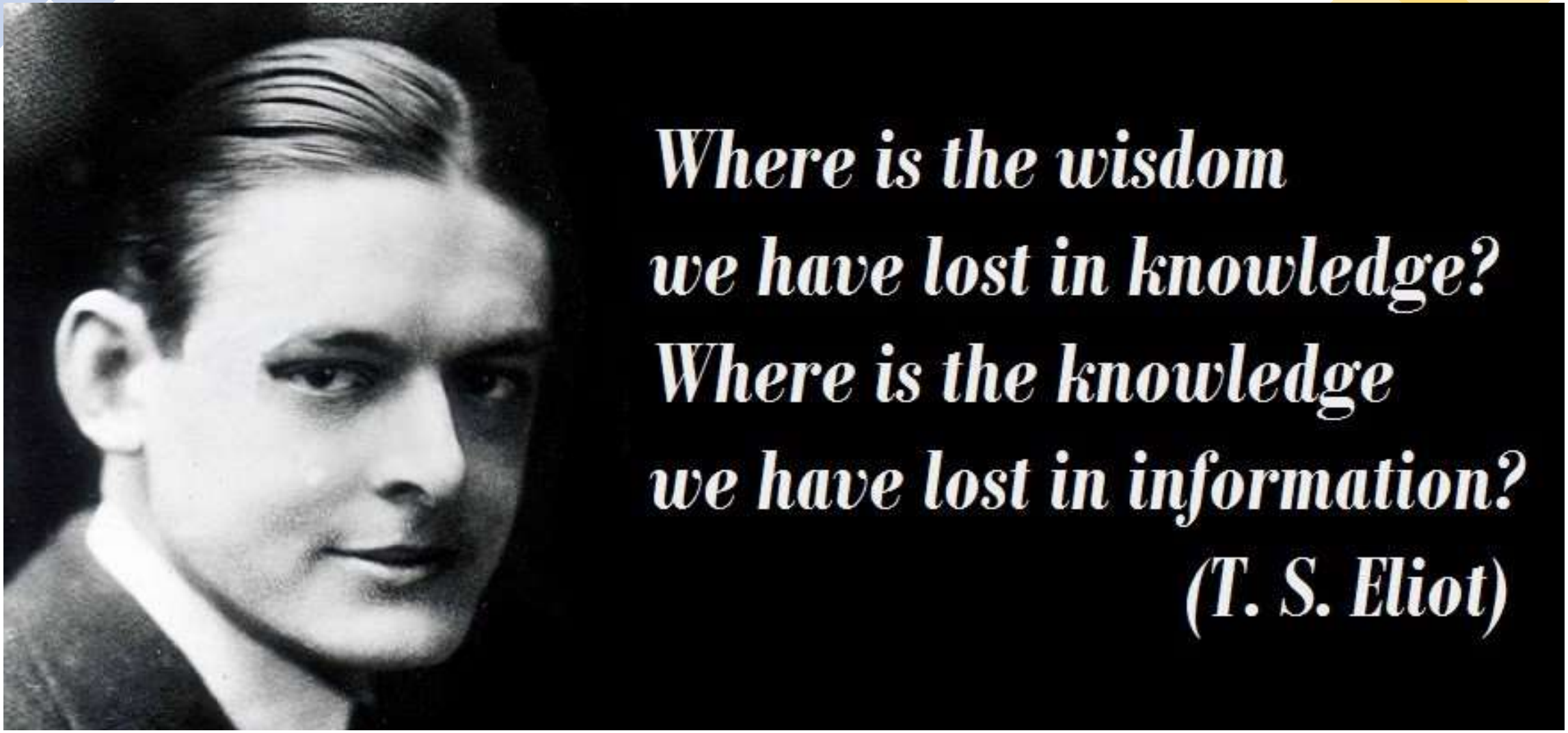
Why Physiology Is Critical to the Practice of Medicine

A 40-year Personal Perspective

Martin J. Tobin, MD

A superior diagnostician looks at the same findings that other clinicians see but thinks of causes that other clinicians have not imagined. Solving clinical mysteries depends on a clinician's power of imagination, the capacity to imagine internal biologic happenings that explain perplexing clinical manifestations

Clin Chest Med 40 (2019) 243–257
https://doi.org/10.1016/j.ccm.2019.02.012

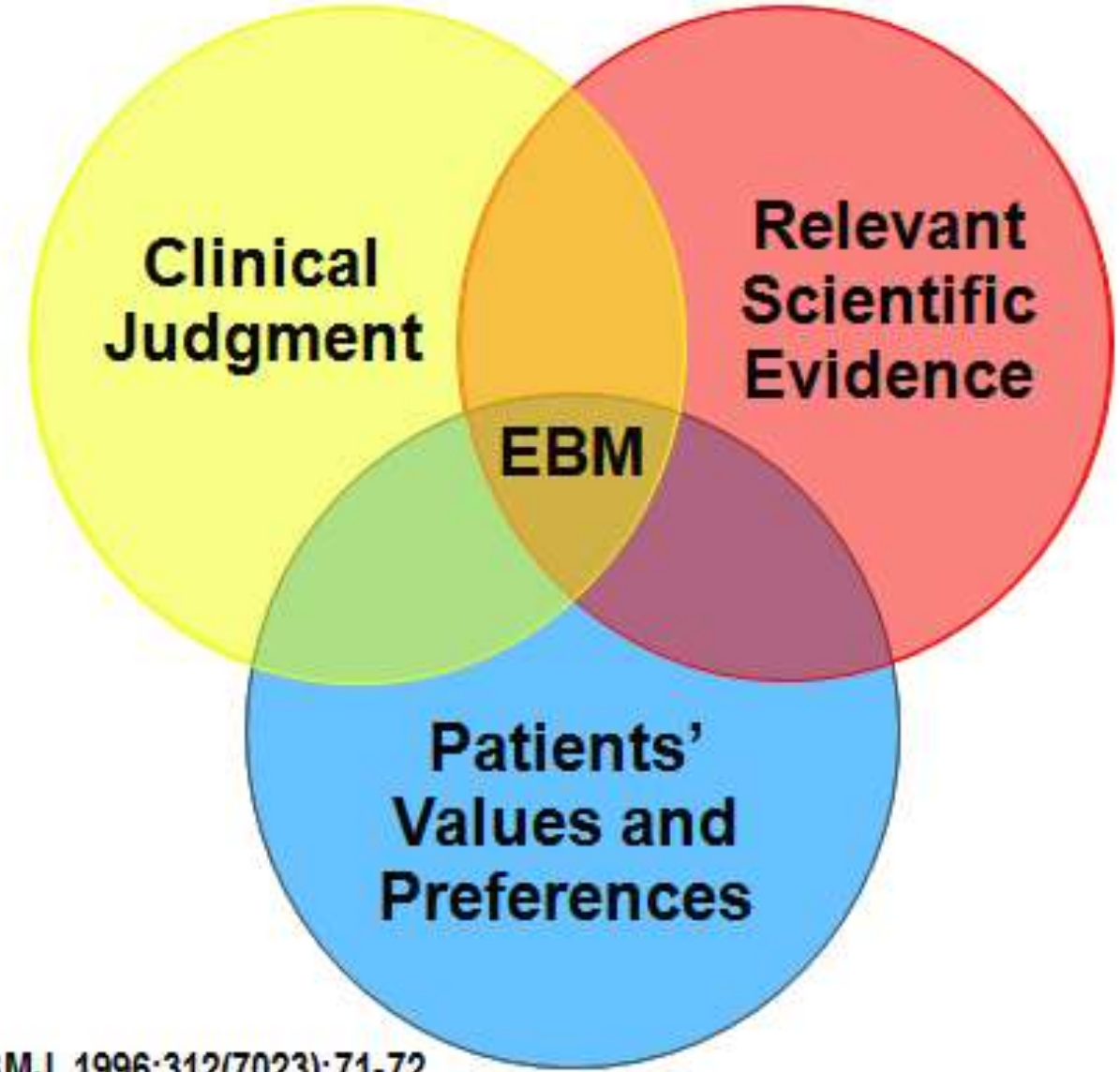

Where is the wisdom
we have lost in knowledge?
Where is the knowledge
we have lost in information?
(T. S. Eliot)

Evidence Based Medicine

Evidence based medicine is not "cookbook" medicine. Because it requires a bottom up approach that integrates the best external evidence with individual clinical expertise and patients' choice, it cannot result in slavish, cookbook approaches to individual patient care. External clinical

David Sackett, BMJ 1996; 312:7

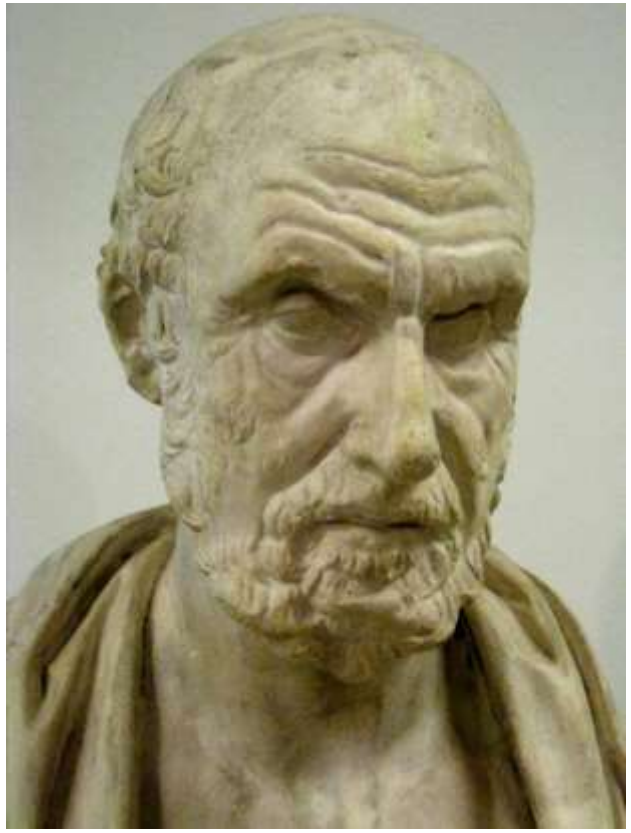
What Is Evidence-Based Medicine?



Sackett DL, et al. BMJ. 1996;312(7023):71-72.

”'Ασκέειν, περὶ τὰ νουσήματα, δύο, ώφελέειν, ἢ μὴ βλάπτειν.“

«Primum non nocere»



«First, do no harm»