Ce que nous pouvons apprendre de la pandémie COVID-19

Décontamination digestive selective et Décontamination cutanée une hérésie, des risques ou des solutions possibles ?

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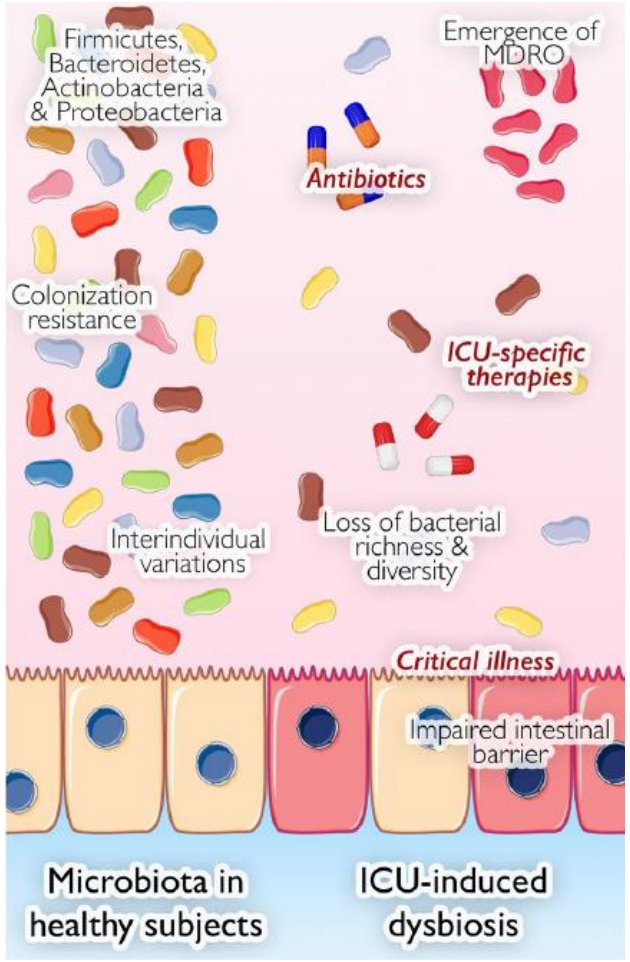
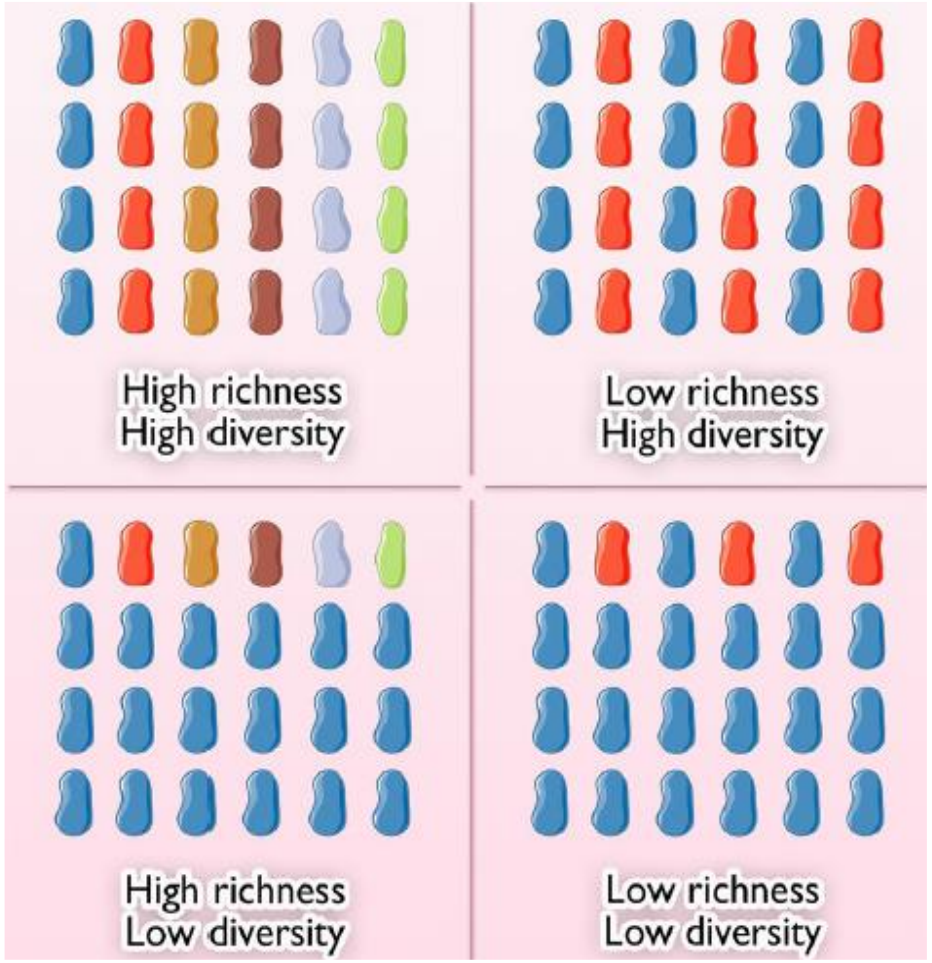
REVIEW Open Access

The role of the microbiota in the management of intensive care patients

Piotr Szychowiak[1,2], Khanh Villageois-Tran[1,3], Juliette Patrier[1,4], Jean-François Timsit[1,4] and Étienne Ruppé[1,5*]





RESEARCH Open Access

Oropharyngeal and intestinal concentrations of opportunistic pathogens are independently associated with death of SARS-CoV-2 critically ill adults

Juliette Patrier[1], Khanh Villageois-Tran[2,3], Piotr Szychowiak[1,3], Stéphane Ruckly[3,5], Rémi Gschwind[3], Paul-Henri Wicky[1], Signara Gueye[4], Laurence Armand-Lefevre[3,4], Mehdi Marzouk[1], Romain Sonneville[1,3,5], Lila Bouadma[1,3,5], Marie Petitjean[3], Fariza Lamara[1,5], Etienne de Montmollin[1,3,5], Jean-Francois Timsit[1,3,5*], Etienne Ruppé[3,4] and The French COVID Cohort Study Group

2022

A single-center observational prospective (from March to September 2020) cohort study in critically ill patients admitted (N = 95) with severe SARS-CoV-2 infection.

Oropharyngeal and rectal swabs were collected (quantitative cultures, 16S rDNA sequencing
- at admission and
- then twice weekly
- until discharge or death.

Oropharyngeal and intestinal concentrations of opportunistic pathogens, intestinal richness and diversity were entered into a multivariable Cox model as time-dependent covariates. The primary outcome was death at day 90.

N = 765 samples

RESEARCH Open Access

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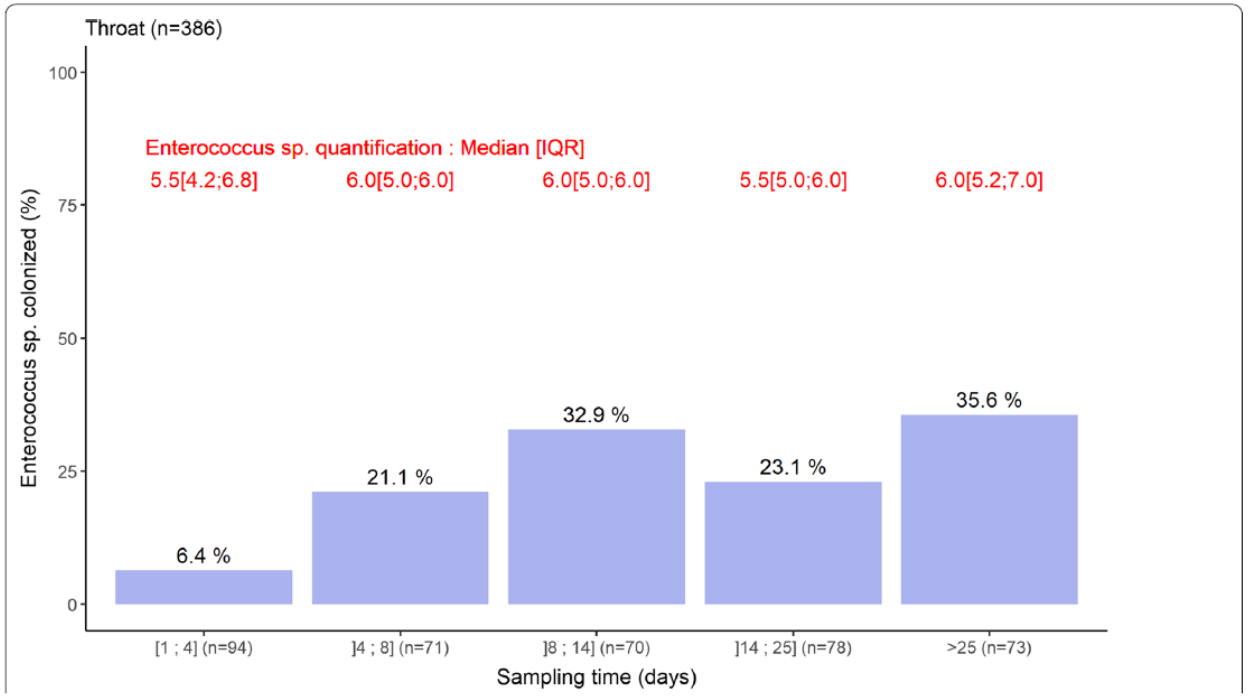
2022



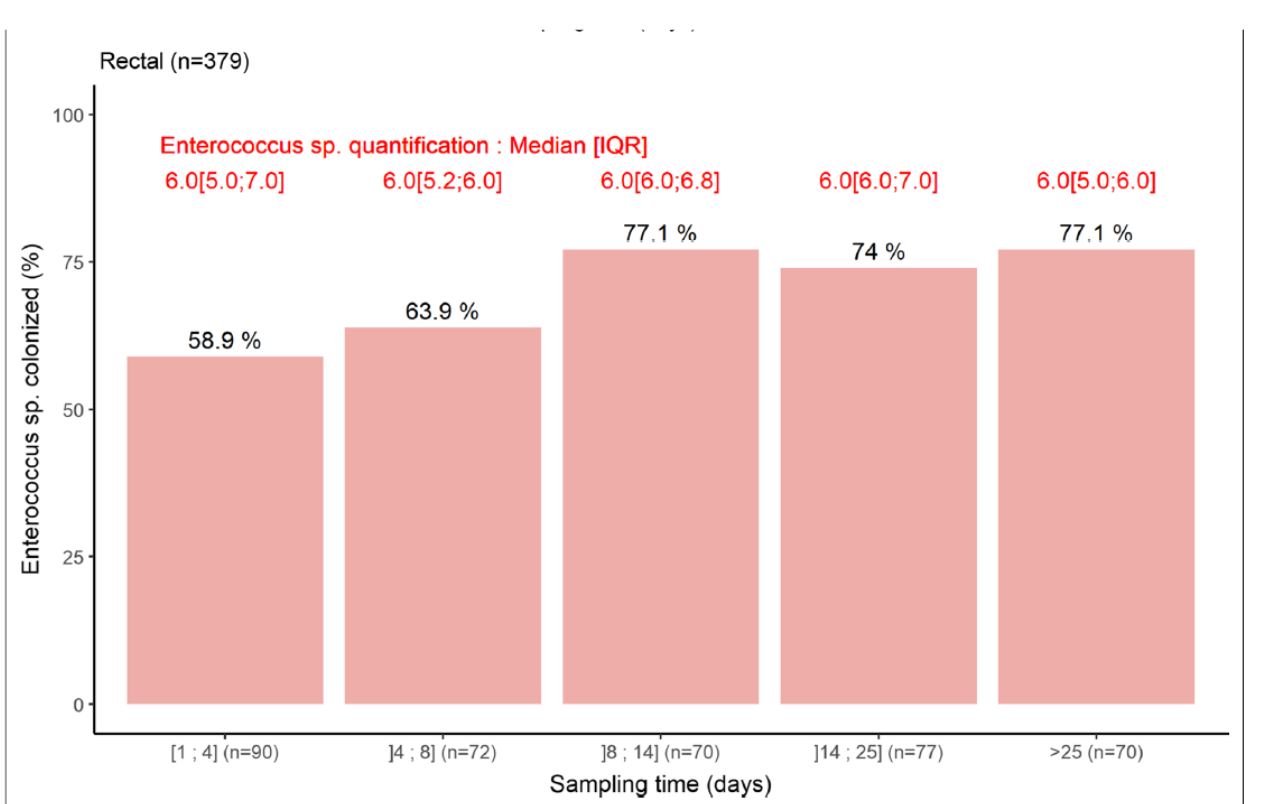


Fig. 1 Boxplot representation of the oropharyngeal (blue) and rectal (red) concentrations of *Enterococcus* spp. according to the sampling time

Table 3 Adjusted impact of *Enterococcus* spp., *S. aureus* and *Candida* spp. oropharyngeal and rectal abundances on day 90 mortality (combined analyses)

	HR	95% CI		*p*
Oropharynx				
Enterococcus spp. Quantitative (log)	1.100	1.010	1.197	0.0281
Antibiotic treatment active against *Enterococcus*/MRSA#	2.872	1.704	4.841	< 0.0001
Candida spp. Quantitative (log)	1.183	1.065	1.313	0.0017
Antifungal treatment active against *Candida* spp.#	1.499	0.846	2.655	0.1650
S. aureus quantitative (log)	1.265	1.112	1.440	0.0004
Antibiotic treatment active against anaerobic bacteria#	2.240	1.343	3.737	0.0020
Age*	1.026	1.004	1.049	0.0230
Chronic diseases**	2.047	1.273	3.291	0.0031
Daily SOFA score*	1.172	1.105	1.243	< 0.0001
Rectal				
Enterococcus spp. quantitative (log)	1.156	1.052	1.270	0.0026
Antibiotic treatment active against *Enterococcus*/MRSA#	2.253	1.296	3.915	0.0040
Candida spp. quantitative (log)	1.182	1.059	1.320	0.0029
Antifungal treatment active against *Candida* spp.#	0.991	0.558	1.759	0.9740
Antibiotic treatment active against anaerobic bacteria#	2.842	1.706	4.733	< 0.0001
S. aureus quantitative (log)	1.470	1.207	1.789	0.0001
Age*	1.030	1.008	1.053	0.0078
Chronic diseases**	2.071	1.267	3.386	0.0037
Daily SOFA score*	1.226	1.157	1.299	< 0.0001

A one-log increase in Enterococcus spp., S. aureus and Candida spp. in oropharyngeal or rectal swabs was associated with a 17% or greater increase in the risk of death.

Patrier et al.

DECONTAMINATION in critically ill patients

SOD = selective oropharyngeal decontamination
SDD = selective digestive tract decontamination

MULTIPLE SITE DECONTAMINATION (MDS)

		Modalities	Microorganisms targeted	HAIs prevention
SOD		MOUTHPASTE Topical polymyxin, tobramycin, and amphotericin B delivered in THROAT	GNB/CGP*/YEASTS *with the exception of MRSA	Pneumonia
SDD strategy		MOUTHPASTE Topical polymyxin, tobramycin, and amphotericin B delivered in THROAT	GNB/CGP*/YEASTS *with the excepton of MRSA	Pneumonia BSI
		SUSPENSION Topical polymyxin, tobramycin, and amphotericin B delivered in GUT		
		AB IV A 4-day course of cefotaxime		
		Strict standard precautions		
		Twice weekly surveillance cultures of throat and rectum		
Skin bathing	Universal MSSA/MRSA eradication	Daily chlorhexidine body wash	MSSA/MRSA	BSI SSI
Nasal decontamination	Universal MSSA/MRSA eradication	2% mupirocin ointment intranasally 2/day	MSSA/MRSA	BSI SSI
Oral care		Mainly chlorhexidine mouthwash	GNB/CGP/YEASTS	Pneumonia

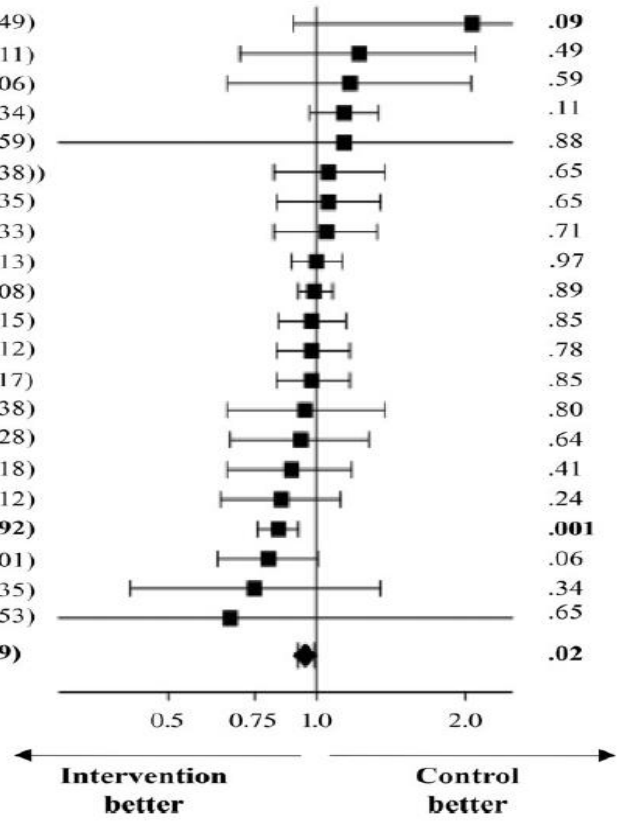
MAJOR ARTICLE

Pneumonia Prevention to Decrease Mortality in ICU: A Systematic review and Meta-analysis

Antoine Roquilly, Emmanuel Marret, Edward Abraham and Karim Asehnoune

Clinical Infectious Diseases
1 August 2010
Volume 51
Number 3
IDSA
HIVMA
THE UNIVERSITY OF CHICAGO PRESS
2015

Intervention	No. of RCTs; No. of Patients (N); I^2, %	Relative Risk (95% CI)	*P* Value
Acidified enteral feeding	1; 120; NA	2.07 (.90–4.49)	**.09**
Tracheal cuff monitoring	2; 264; 0	1.22 (.70–2.11)	.49
PEEP	1; 127; NA	1.17 (.66–2.06)	.59
Silver-coated ET	1; 1509; NA	1.14 (.97–1.34)	.11
Physiotherapy	2; 204; 81	1.14 (.20–6.59)	.88
Patient position	5; 785; 0	1.06 (.82–1.38))	.65
Decreased gastric content	3; 810; 0	1.06 (.83–1.35)	.65
Tracheal saline instillation	1; 262; NA	1.05 (.82–1.33)	.71
Ulcer prophylaxis	16; 3365; 0	1.00 (.89–1.13)	.97
SOD	23; 9666; 0	0.99 (.92–1.08)	.89
Subglottic secretion drainage	9; 2241; 0	0.98 (.84–1.15)	.85
Heat moisture exchanger	13; 2431; 0	0.98 (.86–1.12)	.78
Closed suctioning system	5; 909; 0	0.98 (.83–1.17)	.85
Aerosolized antibiotic	5; 450; 23	0.95 (.66–1.38)	.80
Post pyloric feeding	6; 582; 0	0.93 (.67–1.28)	.64
Probiotic/symbiotic	13; 1569; 23	0.89 (.66–1.18)	.41
Early tracheotomy	6; 1050; 45	0.85 (.64–1.12)	.24
SDD	**30; 10 227; 16**	**0.84 (.76–0.92)**	**.001**
Sinusitis prophylaxis	1; 399; NA	0.80 (.63–1.01)	.06
Early enteral feeding	1; 150; NA	0.75 (.42–1.35)	.34
Phytotherapy	1; 36; NA	0.67 (.13–3.53)	.65
Overall	**145; N=37156; 4**	**0.95 (.92–.99)**	**.02**



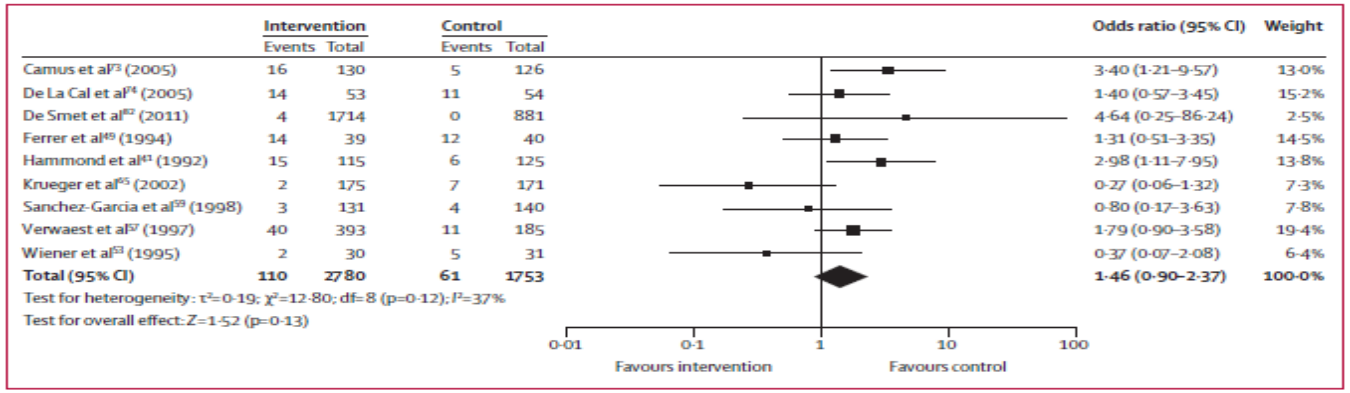
Articles

THE LANCET
Infectious Diseases

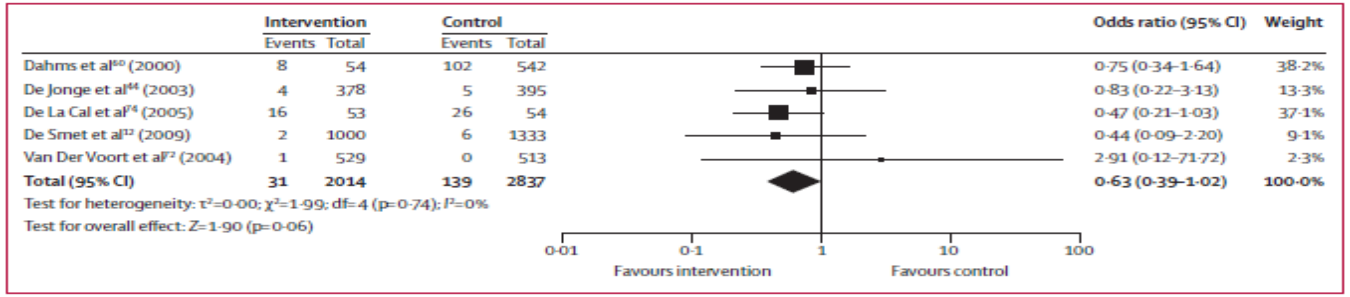
2013

Effect of selective decontamination on antimicrobial resistance in intensive care units: a systematic review and meta-analysis

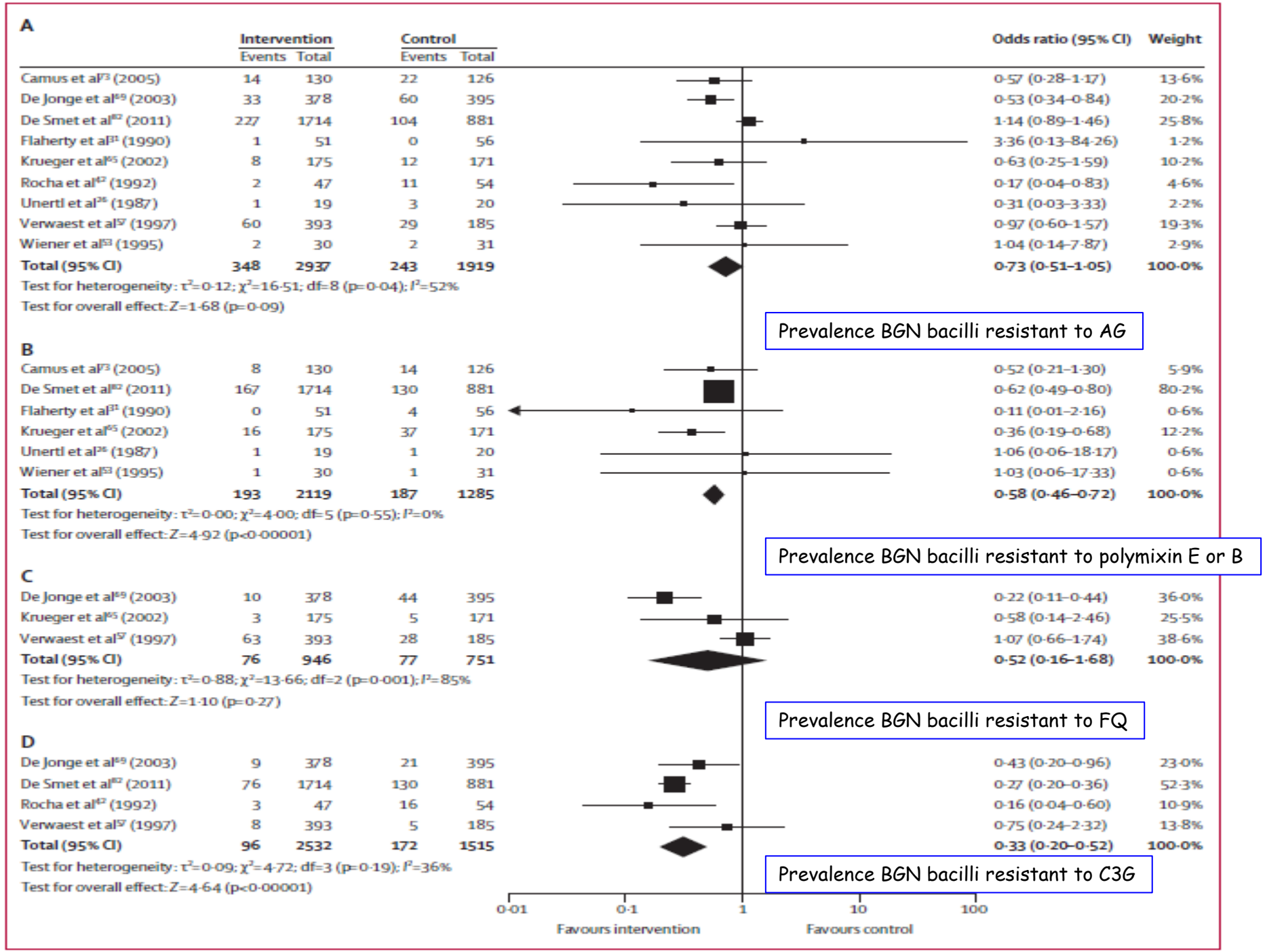
Nick Daneman, Syed Sarwar, Robert A Fowler, Brian H Cuthbertson, on behalf of the SuDDICU Canadian Study Group



MRSA



VRE


A
Intervention
Events Total
Control
Events Total
Odds ratio (95% CI)
Weight
Camus et al[73] (2005) 14 130 22 126 0·57 (0·28–1·17) 13·6%
De Jonge et al[69] (2003) 33 378 60 395 0·53 (0·34–0·84) 20·2%
De Smet et al[82] (2011) 227 1714 104 881 1·14 (0·89–1·46) 25·8%
Flaherty et al[31] (1990) 1 51 0 56 3·36 (0·13–84·26) 1·2%
Krueger et al[65] (2002) 8 175 12 171 0·63 (0·25–1·59) 10·2%
Rocha et al[42] (1992) 2 47 11 54 0·17 (0·04–0·83) 4·6%
Unertl et al[26] (1987) 1 19 3 20 0·31 (0·03–3·33) 2·2%
Verwaest et al[57] (1997) 60 393 29 185 0·97 (0·60–1·57) 19·3%
Wiener et al[53] (1995) 2 30 2 31 1·04 (0·14–7·87) 2·9%
Total (95% CI) 348 2937 243 1919 0·73 (0·51–1·05) 100·0%
Test for heterogeneity: τ²=0·12; χ²=16·51; df=8 (p=0·04); I²=52%
Test for overall effect: Z=1·68 (p=0·09)
Prevalence BGN bacilli resistant to AG
B
Camus et al[73] (2005) 8 130 14 126 0·52 (0·21–1·30) 5·9%
De Smet et al[82] (2011) 167 1714 130 881 0·62 (0·49–0·80) 80·2%
Flaherty et al[31] (1990) 0 51 4 56 0·11 (0·01–2·16) 0·6%
Krueger et al[65] (2002) 16 175 37 171 0·36 (0·19–0·68) 12·2%
Unertl et al[26] (1987) 1 19 1 20 1·06 (0·06–18·17) 0·6%
Wiener et al[53] (1995) 1 30 1 31 1·03 (0·06–17·33) 0·6%
Total (95% CI) 193 2119 187 1285 0·58 (0·46–0·72) 100·0%
Test for heterogeneity: τ²=0·00; χ²=4·00; df=5 (p=0·55); I²=0%
Test for overall effect: Z=4·92 (p<0·00001)
Prevalence BGN bacilli resistant to polymixin E or B
C
De Jonge et al[69] (2003) 10 378 44 395 0·22 (0·11–0·44) 36·0%
Krueger et al[65] (2002) 3 175 5 171 0·58 (0·14–2·46) 25·5%
Verwaest et al[57] (1997) 63 393 28 185 1·07 (0·66–1·74) 38·6%
Total (95% CI) 76 946 77 751 0·52 (0·16–1·68) 100·0%
Test for heterogeneity: τ²=0·88; χ²=13·66; df=2 (p=0·001); I²=85%
Test for overall effect: Z=1·10 (p=0·27)
Prevalence BGN bacilli resistant to FQ
D
De Jonge et al[69] (2003) 9 378 21 395 0·43 (0·20–0·96) 23·0%
De Smet et al[82] (2011) 76 1714 130 881 0·27 (0·20–0·36) 52·3%
Rocha et al[42] (1992) 3 47 16 54 0·16 (0·04–0·60) 10·9%
Verwaest et al[57] (1997) 8 393 5 185 0·75 (0·24–2·32) 13·8%
Total (95% CI) 96 2532 172 1515 0·33 (0·20–0·52) 100·0%
Test for heterogeneity: τ²=0·09; χ²=4·72; df=3 (p=0·19); I²=36%
Test for overall effect: Z=4·64 (p<0·00001)
Prevalence BGN bacilli resistant to C3G
0·01
0·1
1
10
100
Favours intervention
Favours control

Research

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Decontamination Strategies and Bloodstream Infections With Antibiotic-Resistant Microorganisms in Ventilated Patients

A Randomized Clinical Trial

Bastiaan H. Wittekamp, MD, PhD; Nienke L. Plantinga, MD, PhD; Ben S. Cooper, PhD; Joaquin Lopez-Contreras, MD, PhD; Pere Coll, MD, PhD; Jordi Mancebo, MD; Matt P. Wise, MD, PhD; Matt P. G. Morgan, MD, PhD; Pieter Depuydt, MD, PhD; Jerina Boelens, MD, PhD; Thierry Dugernier, MD, PhD; Valérie Verbelen, PhD; Philippe G. Jorens, MD, PhD; Walter Verbrugghe, MD; Surbhi Malhotra-Kumar, PhD; Pierre Damas, MD, PhD; Cécile Meex, PhD; Kris Leleu, MD; Anne-Marie van den Abeele, MD; Ana Filipa Gomes Pimenta de Matos, MSc; Sara Fernández Méndez, MD; Andrea Vergara Gomez, Msc; Viktorija Tomic, MD, PhD; Franc Sifrer, MD; Esther Villarreal Tello, MD; Jesus Ruiz Ramos, PhD; Irene Aragao, MD; Claudia Santos, MD; Roberta H. M. Sperning, Msc; Patrizia Coppadoro, BSc; Giuseppe Nardi, MD; Christian Brun-Buisson, MD, PhD; Marc J. M. Bonten, MD, PhD

OBJECTIVE To determine associations between CHX 2%, SOD, and SDD and the occurrence of ICU-acquired bloodstream infections with multidrug-resistant gram-negative bacteria (MDRGNB) and 28-day mortality in ICUs with moderate to high levels of antibiotic resistance.

DESIGN, SETTING, AND PARTICIPANTS Randomized trial conducted from December 1, 2013, to May 31, 2017, in 13 European ICUs where at least 5% of bloodstream infections are caused by extended-spectrum β-lactamase–producing Enterobacteriaceae. Patients with anticipated mechanical ventilation of more than 24 hours were eligible. The final date of follow-up was September 20, 2017.

INTERVENTIONS Standard care was daily CHX 2% body washings and a hand hygiene improvement program. Following a baseline period from 6 to 14 months, each ICU was assigned in random order to 3 separate 6-month intervention periods with either CHX 2% mouthwash, SOD (mouthpaste with colistin, tobramycin, and nystatin), or SDD (the same mouthpaste and gastrointestinal suspension with the same antibiotics), all applied 4 times daily.

MAIN OUTCOMES AND MEASURES The occurrence of ICU-acquired bloodstream infection with MDRGNB (primary outcome) and 28-day mortality (secondary outcome) during each intervention period compared with the baseline period.

Figure. Flowchart and Cohorts for Analyses

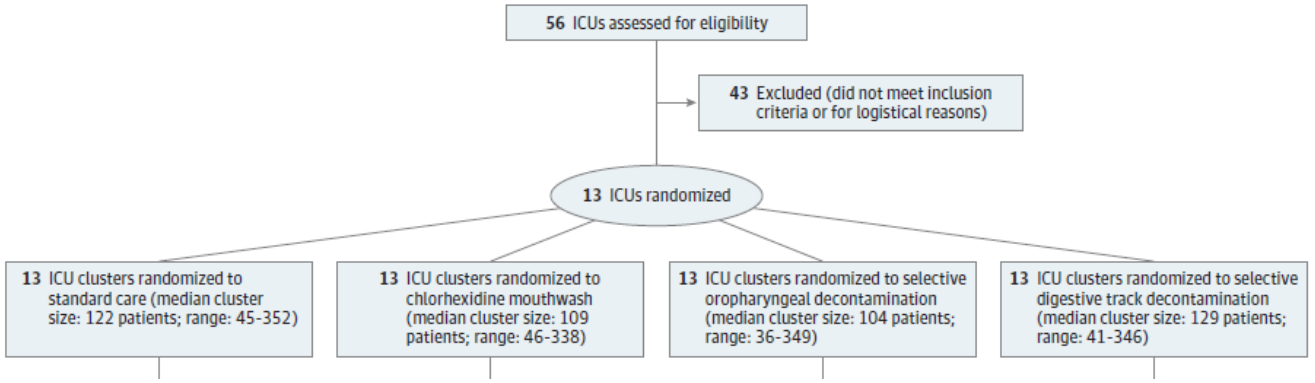
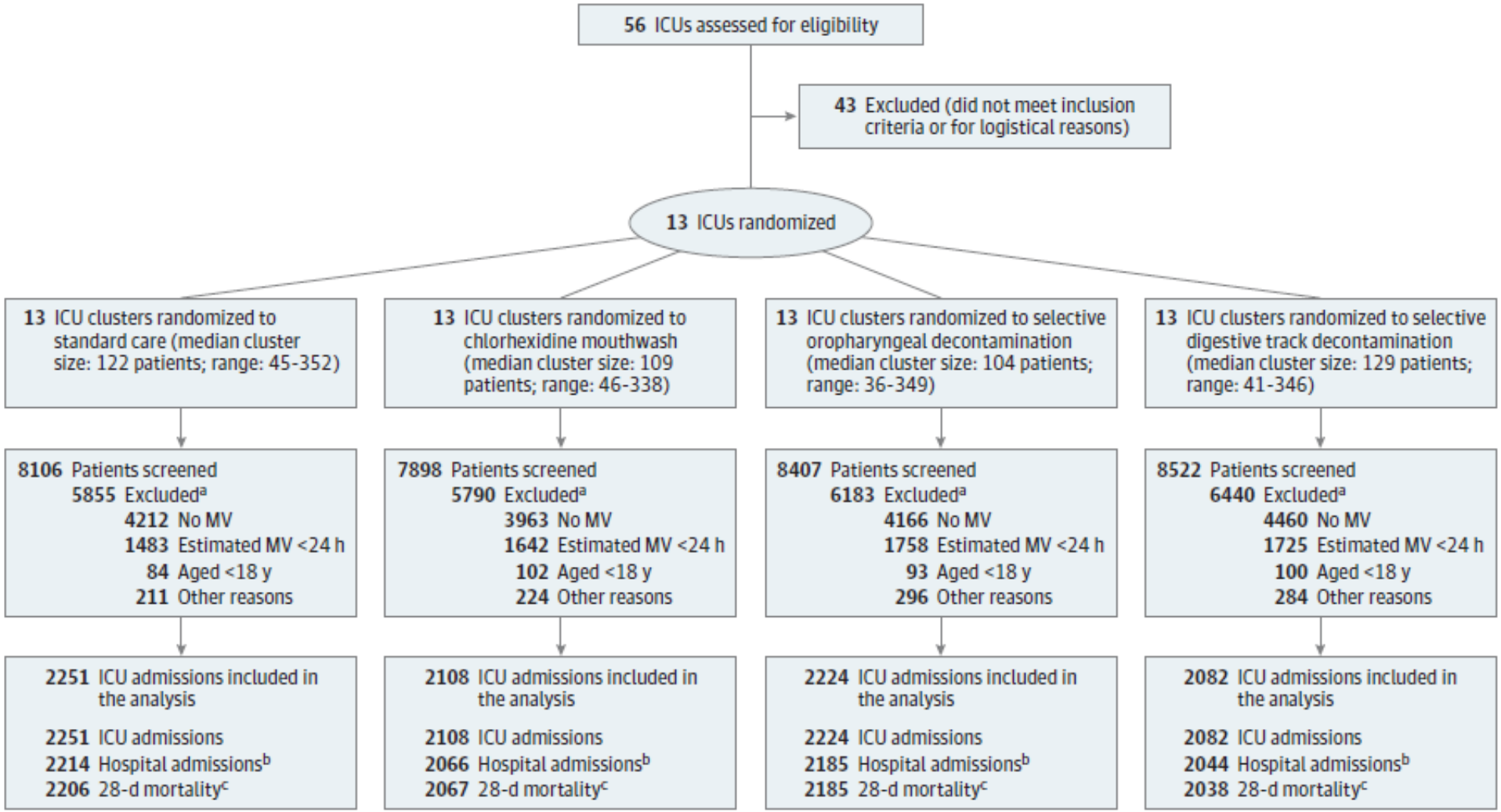


Figure. Flowchart and Cohorts for Analyses



Abbreviations: ICU, intensive care unit; MV, mechanical ventilation.

[a] Some patients had multiple reasons for exclusion.

[b] The cohort for hospital mortality included 8509 unique hospital admissions, 37 with missing hospital mortality status.

[c] The cohort for 28-day mortality included 8496 unique ICU admissions with no prior ICU admission within 30 days, 56 with missing 28-day mortality status.

Research

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Decontamination Strategies and Bloodstream Infections With Antibiotic-Resistant Microorganisms in Ventilated Patients

A Randomized Clinical Trial

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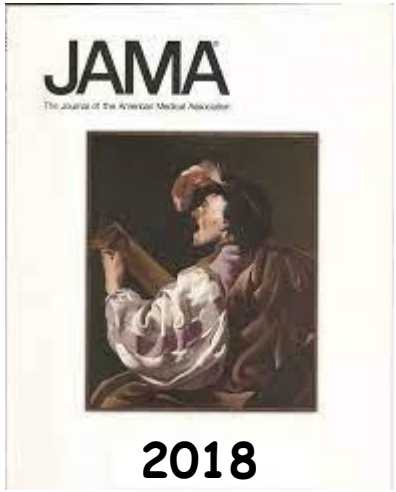


Table 2. ICU-Acquired Bloodstream Infections per Study Group

Study Group	Baseline (n = 2251)		CHX (n = 2108)		SOD (n = 2224)		SDD (n = 2082)	
	No. of Episodes	Proportion of BSI Episodes, %	No. of Episodes	Proportion of BSI Episodes, %	No. of Episodes	Proportion of BSI Episodes, %	No. of Episodes	Proportion of BSI Episodes, %
Primary Outcome: ICU-Acquired BSIs With Multidrug-Resistant Gram-Negative Bacteria (MDRGNB)[a,b]								
BSI with MDRGNB, No. of episodes, (No. of patients)	52 (47)		41 (38)		34 (33)		27 (26)	
Enterobacteriaceae	39	75.0	29	70.7	26	76.5	24	88.9
Resistant to third-generation cephalosporins	35		25		24		24	
Resistant to colistin	2		2		5		5	
Glucose nonfermenting gram-negative bacteria	9	17.3	10	24.4	5	14.7	3	11.1
Pseudomonas species	4		9		3		2	
Other glucose nonfermenting gram-negative bacteria[c]	4	7.7	2	4.9	3	8.8	0	0.0

R1.2 – **In units where multidrug-resistant bacteria prevalence is weak (< 20%),** we suggest applying a selective digestive decontamination using a topical antiseptic administered enterally and a prophylactic antibiotic through systemic administration for < 5 days to decrease mortality.

GRADE 2+, STRONG AGREEMENT

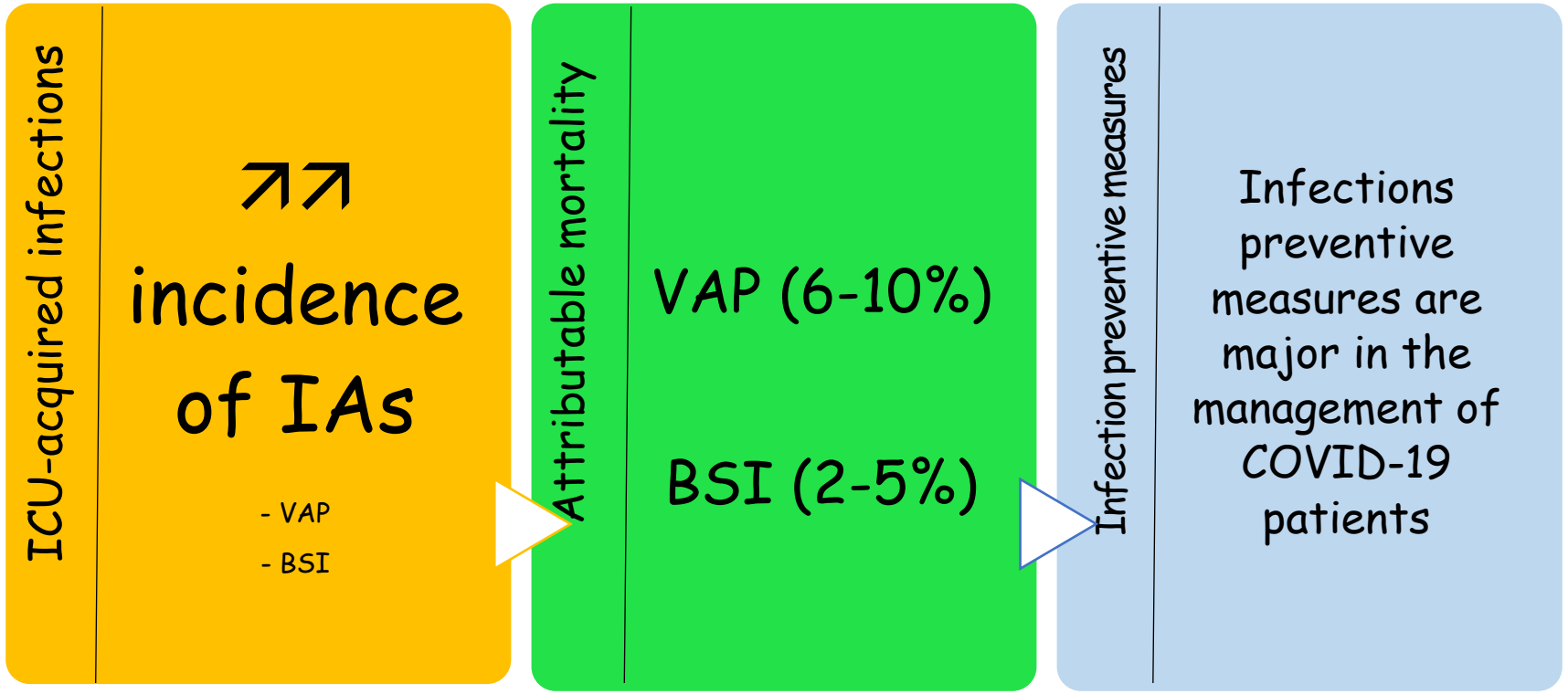
SDD has shown a significant decrease in hospitality mortality, lengths of mechanical ventilation and HAP incidence in ICU patients [Liberati, Cochrane Database Syst Rev, 2009].

The effect of SDD on mortality

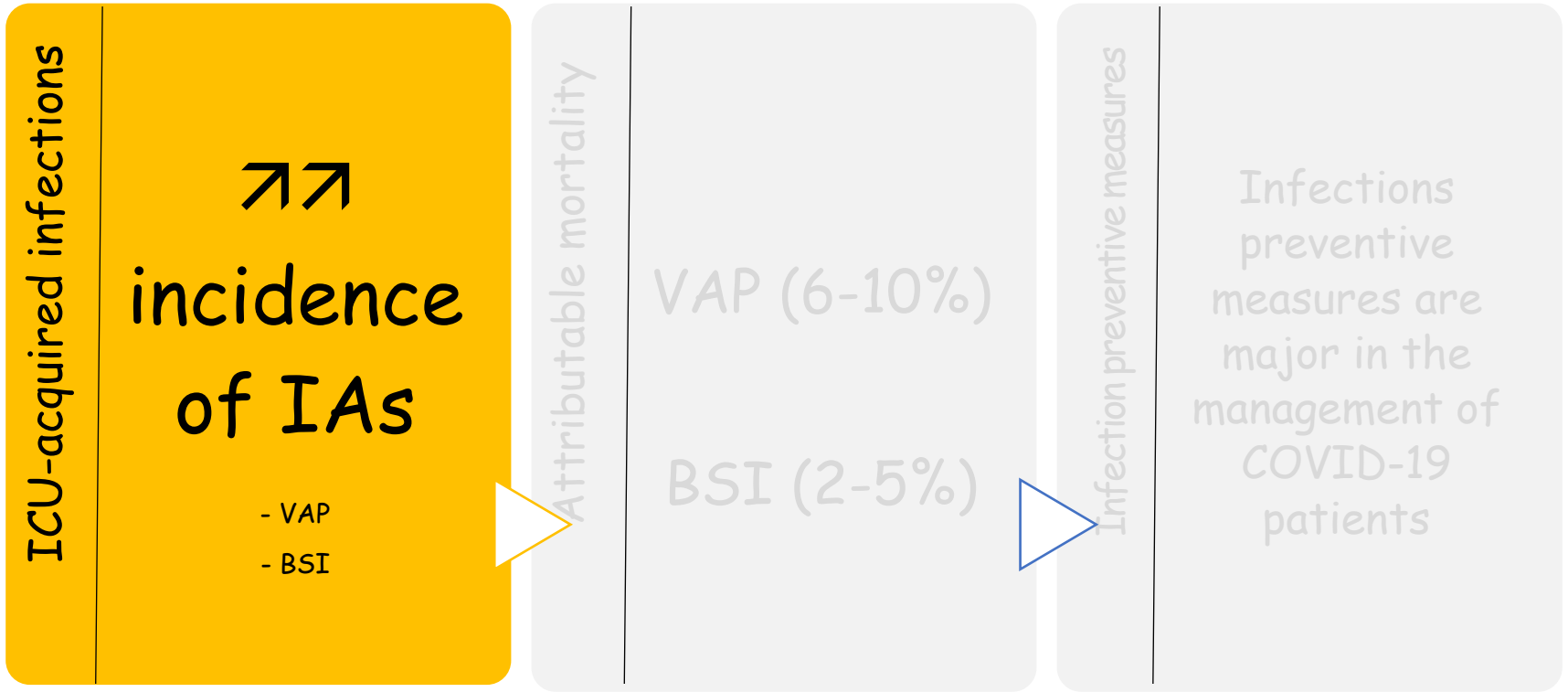
- was similar in medical and surgical patients [Melsen, Br J Surg, 2012].
- was greater in patients with high overall mortality [Roquilly, CID, 2015].
- was only observed for strategies including a topical antiseptic administered enterally and systemic prophylactic antibiotic use [Roquilly, CID, 2015].

Studies testing SDD were conducted in environments where the prevalence of multiresistant bacteria was low [de Smet, NEJM, 2009], with no link between SDD and the development of bacterial resistance [Daneman, LID, 2017].

Rationale for using decontamination in patients with COVID-19



Rationale for using decontamination in patients with COVID-19



Are patients with SARS-CoV-2 pneumonia at increased risk of HIAs?

PRO

- ARDS a well-known risk factor for VAP
- Specific pulmonary lesions related to SARS-CoV-2 infection
- Long duration of mechanical ventilation
- SARS-CoV-2 is responsible for altered immune response
- Immunosuppressive agents are commonly used
- Severe lung and gut endothelial injury
- Covid-19 associated surge

CON

- Low severity score
- A higher nurse/patients ratio

Strict hygiene and isolation measures used to avoid cross-transmission of the virus

ORIGINAL

Relationship between SARS-CoV-2 infection and the incidence of ventilator-associated lower respiratory tract infections: a European multicenter cohort study

Anahita Rouzé[1,2], Ignacio Martin-Loeches[3,4], Pedro Povoa[5,6], Demosthenes Makris[7], Antonio Artigas[8],

- A multicenter retrospective European cohort performed in 36 ICUs.
- All adult patients receiving IMV > 48 h, if they had: SARS-CoV-2 pneumonia, influenza pneumonia, or no viral infection at ICU admission.
- VA-LRTI, including VAT and VAP, diagnosed using clinical, radiological and quantitative microbiological criteria.
- All VA-LRTI were prospectively identified, and chest-X rays were analyzed by at least two physicians.
- Cumulative incidence of first episodes of VA-LRTI was estimated using the Kalbfleisch and Prentice method, and compared using Fine-and Gray models.
- Cause-specific regression model.

Take-home message

The incidence of VA-LRTI is significantly higher in patients with SARS-CoV-2 infection, as compared to patients with influenza pneumonia, or no viral infection.

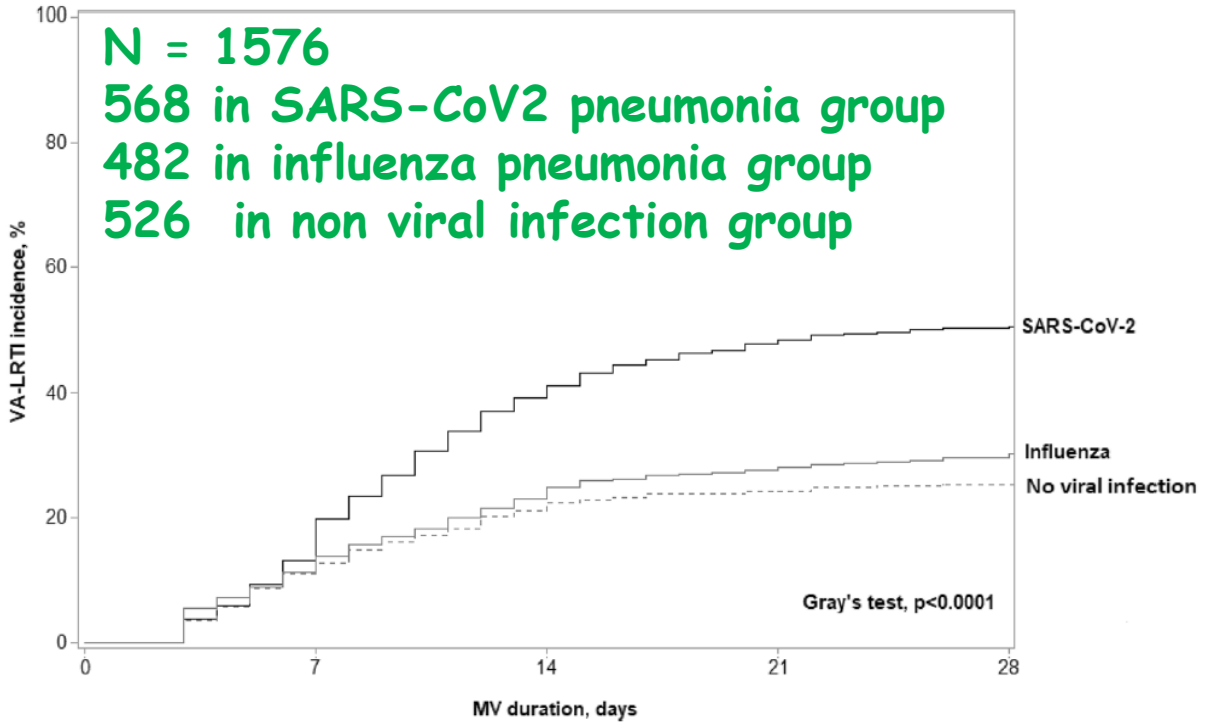


Fig. 1 The 28-day cumulative incidence of ventilator-associated lower respiratory tract infections. Cumulative incidence estimated using Kalbfleish and Prentice method, considering extubation (dead or alive) within 28 days as competing event. *VA-LRTI* ventilator-associated respiratory tract infection, *MV* mechanical ventilation

ORIGINAL

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Anahita Rouzé[1,2], Ignacio Martin-Loeches[3,4], Pedro Povoa[5,6], Demosthenes Makris[7], Antonio Artigas[8],

Table 3 Incidence of first episodes of ventilator-associated lower respiratory tract infections

	SARS-CoV-2 ($n=568$)	Influenza ($n=482$)	No viral infection ($n=526$)	p value[a]	Unadjusted SHR (95%CI)		Adjusted SHR (95%CI)[e]	
					SARS-CoV-2 vs. Influenza	SARS-CoV-2 vs. No viral infection	SARS-CoV-2 vs. Influenza	SARS-CoV-2 vs. No viral infection
VALRTI	287 (50.5)	146 (30.3)	133 (25.3)	<0.0001	1.87 (1.53–2.27)[b]	2.27 (1.84–2.79)[b]	1.60 (1.26–2.04)[b]	1.7 (1.2–2.39)[b]
VAT[c]	82 (14.4)	39 (8.1)	46 (8.8)	0.0001	1.83 (1.25–2.68)[b]	1.69 (1.18–2.43)[b]	1.50 (0.89–2.54)	1.25 (0.7–2.2)
VAP[d]	205 (36.1)	107 (22.2)	87 (16.5)	<0.0001	1.74 (1.38–2.2)[b]	2.38 (1.84–3.06)[b]	1.57 (1.2–2.04)[b]	1.84 (1.26–2.7)[b]

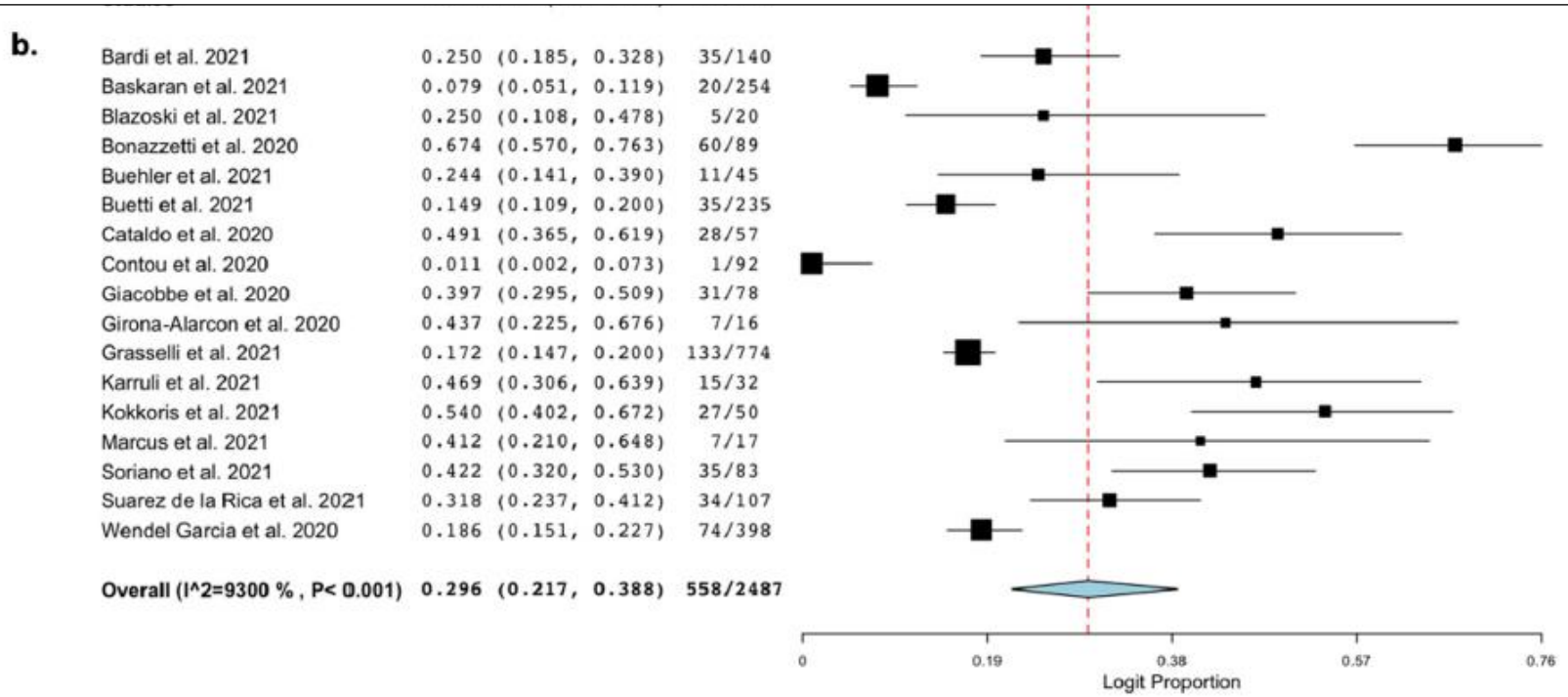
microorganisms

MDPI

Article

Bloodstream Infections in Hospitalized Patients with COVID-19: A Systematic Review and Meta-Analysis

Mariachiara Ippolito [1], Barbara Simone [1], Carlotta Filisina [1], Francesca Romana Catalanotto [1], Giulia Catalisano [1], Claudia Marino [1], Giovanni Misseri [2], Antonino Giarratano [1,3] and Andrea Cortegiani [1,3,*]



Open Forum Infectious Diseases

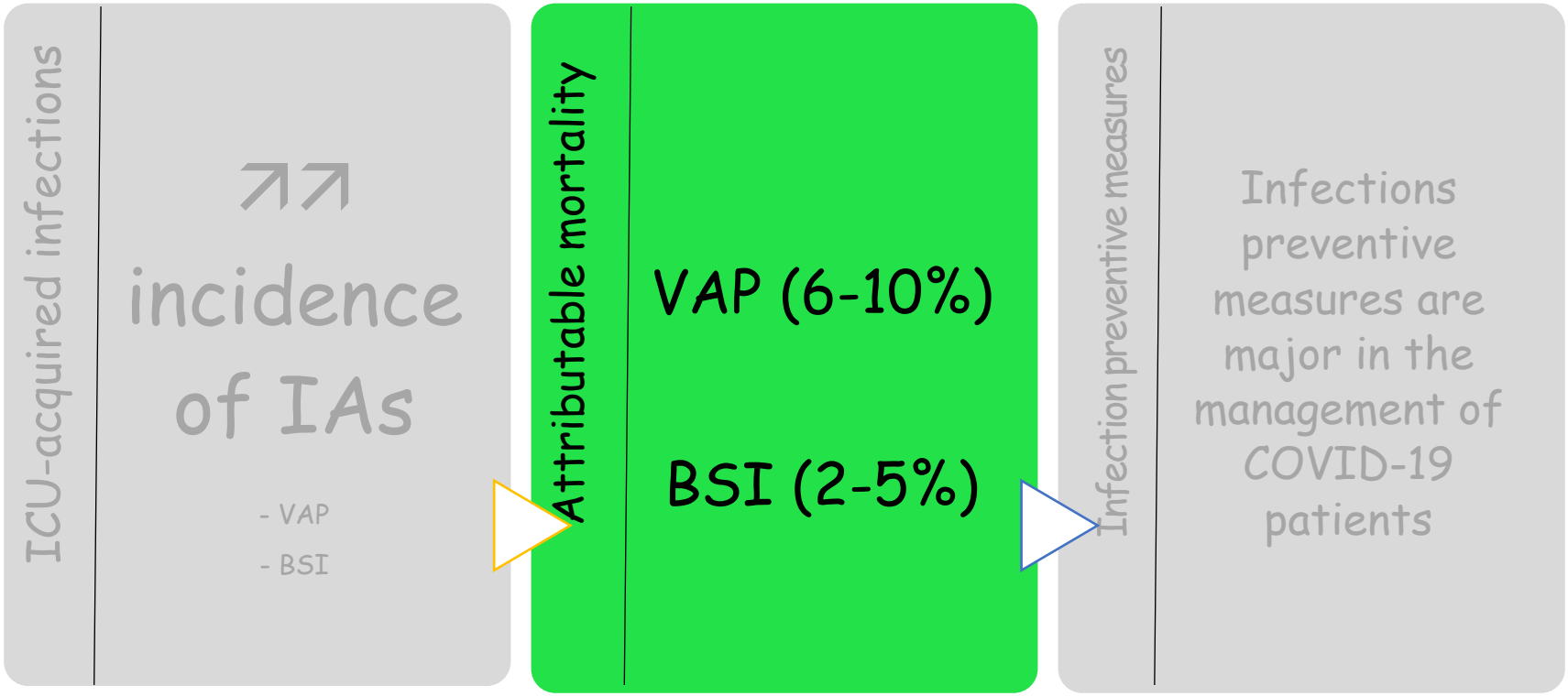
MAJOR ARTICLE

Coronavirus Disease 2019–Associated Invasive Fungal Infection

John W. Baddley,[1,a] George R.Thompson III,[2,a] Sharon C.-A. Chen,[3] P. Lewis White,[4] Melissa D. Johnson,[5] M. Hong Nguyen,[6] Ilan S. Schwartz,[7] Andrej Spec,[8] Luis Ostrosky-Zeichner,[9] Brendan R. Jackson,[10] Thomas F. Patterson,[11,12] and Peter G. Pappas[13]

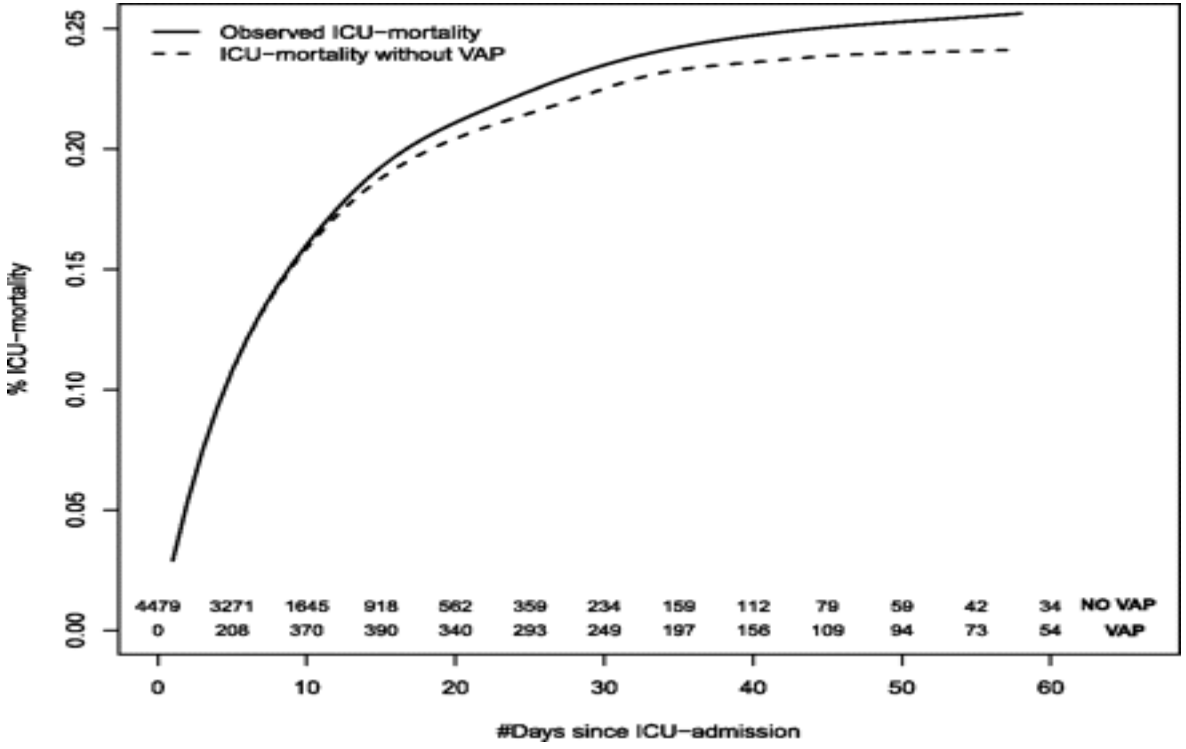
Reports focused on ICU patients only					
New Delhi, India [6]	ICU	2.5% (15/596)	Blood	*C. auris* (10) predominant, Ca (3), Ct (1), Ck (1)	April to July 2020
Milan, Italy [7]	ICU	3.4% (3/89)	Blood	Not described	February 21 to April 30, 2020
Genoa, Italy [8]	ICU	3.8% (3/78)	Blood	Ca (1), Cp (1) and Ct (1)	February 20 to April 10, 2020
NY, USA [9]	ICU	5.1% (12/236)	Blood	Ca (4), Cp (3), Cg (2), Ct (2), *C. dubliniensis* (1)	Start date not known; end date: Oct 31, 2020
Rome, Italy [10]	ICU	8.8% (5/57)	Blood	Ca (2), Cp (2), Cg+Cp (1)	March 1 to April 15
New Jersey, US [11]	ICU	8.9% (8/89)	Blood	Ca (2), Cp (2), Cg (2), Ct (2)	March 10 to April 10, 2020
Spain [12]	ICU	11% (15/139)	Included blood only (other sites excluded)	Ca (9), Cp (4), Cg (2)	February 28 to June 28, 2020
Welsh, UK [13]	ICU	11.8% (16/135), and a case of Rhodotorula	Blood (15) Ascites (1) Chest drain (1)	Candida sp (Ca most common) Candida sp (1), non-speciated yeast (1)	Timeline not given
Athens, Greece [14]	ICU	14% (7/50)	Blood	Ca (4), Cp (3)	March 19 to May 20, 2020

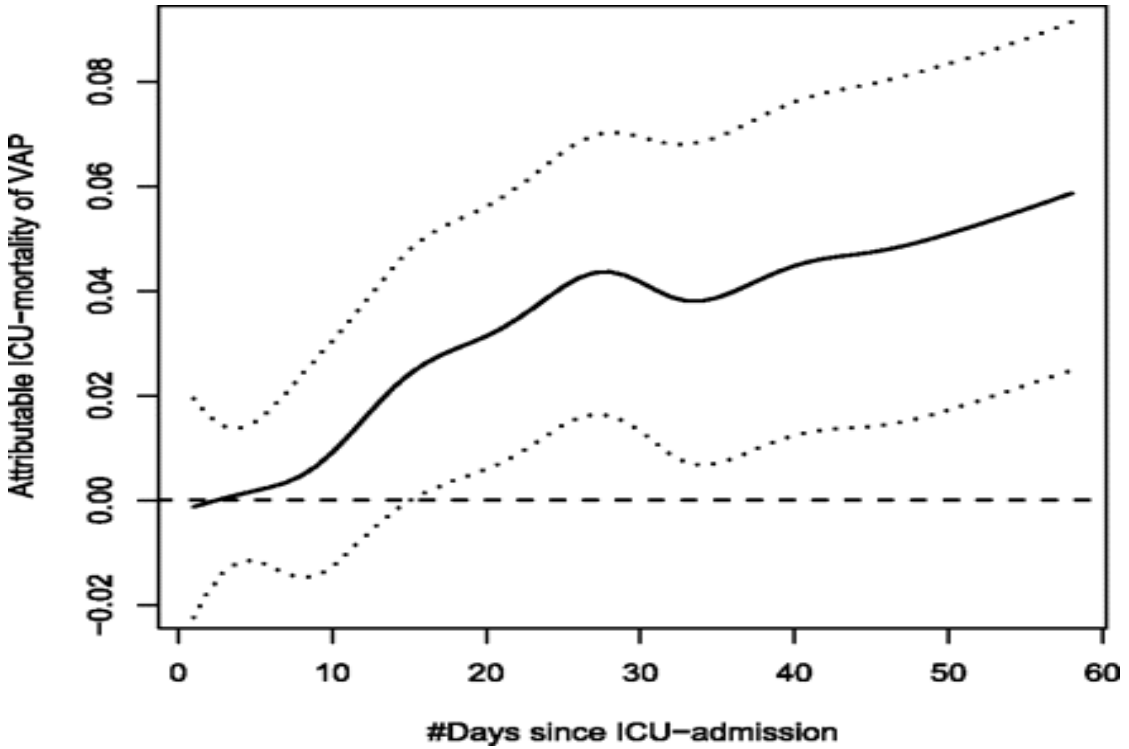
Rationale for using decontamination in patients with COVID-19



Attributable mortality of ventilator-associated pneumonia: a reappraisal using causal analysis.

Bekaert M, Timsit JF, Vansteelandt S, Depuydt P, Vésin A, Garrouste-Orgeas M, Decruyenaere J, Clec'h C, Azoulay E, Benoit D; Outcomerea Study Group





ORIGINAL ARTICLE

European Journal of Clinical Microbiology & Infectious Diseases
2021

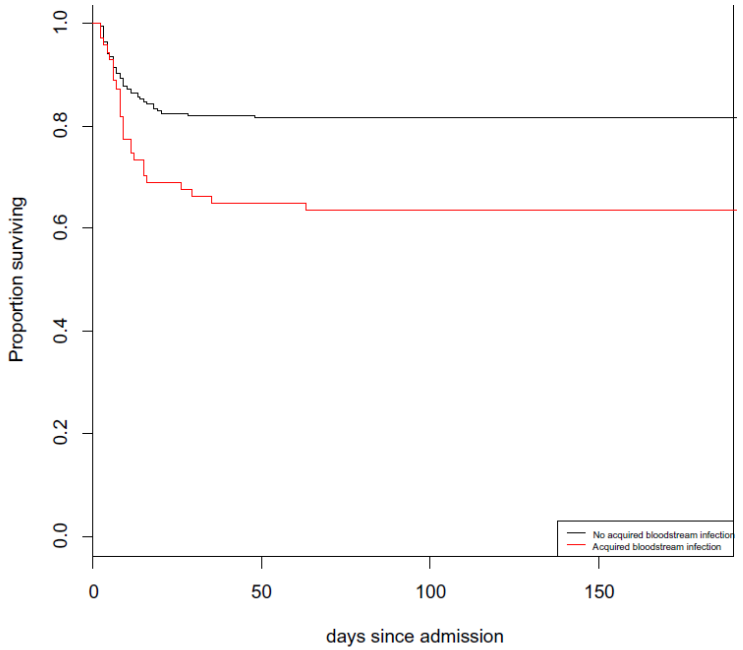
Attributable mortality of ICU acquired bloodstream infections: a propensity-score matched analysis

Nicolas Massart [1,2,3] · Guilhem Wattecamps [4] · Mikael Moriconi [4] · Pierre Fillatre [1]

Table 1 Baseline characteristics and outcome of study patients

	All patients		Patients with BSI		Matched patients		*p*-value*	Standardized mean difference
	n = 2464		*n* = 71		*n* = 213			
Age, years, median [IQR]	64.9	[55.2-73.4]	64.8	[53.1-70.4]	63.7	[55.2-62.0]	0.85	0.47
SAPS II, median [IQR]	44	[32-58]	53	[34-66]	48	[37-64]	0.80	1.00
Male – no. (%)	1598	(64.9)	49	(69.0)	147	(69.0)	1	0.00
Localization before admission								
Acute care ward – no. (%)	914	(37.1)	31	(43.7)	87	(40.9)	0.78	0.03
Home – no. (%)	1439	(58.4)	36	(50.7)	111	(52.1)	0.94	0.01
Long-term care facility– no. (%)	31	(1.3)	2	(2.8)	9	(4.2)	0.86	0.01
Other ICU – no. (%)	53	(2.2)	1	(1.4)	4	(1.9)	0.75	0.00
Reason for admission								
Trauma – no. (%)	162	(65.8)	4	(5.6)	16	(7.5)	0.79	0.02
Surgical – no. (%)	496	(20.1)	17	(23.9)	54	(25.4)	0.94	0.01
Medical – no. (%)	1968	(79.9)	54	(76.1)	159	(74.6)	0.94	0.01
Antibiotic before admission – no. (%)	1434	(58.2)	42	(59.2)	136	(63.9)	0.57	0.00
Immunosuppresion – no. (%)	140	(5.7)	4	(5.6)	10	(4.7)	1	0.00
Neutropenia (<500/mL) – no. (%)	31	(1.3)	1	(1.4)	2	(0.9)	1	0.00
Intubation during period at risk for BSI – no. (%)	1731	(70.3)	65	(91.6)	196	(92.0)	1	0.00
Catheter during period at risk for BSI – no. (%)	1621	(65.8)	67	(94.4)	202	(94.8)	1	0.00
Number of days at risk for BSI, days, median [IQR]	4	[1-9]	6	[3-12]	6	[2-11]	0.64	0.06
Lenght of stay in ICU, days, median [IQR]	6	[3-12]	18	[13-44]	8	[5-14]	<0.001	
Death in ICU – no. (%)	459	(18.6)	26	(36.6)	46	(21.6)	0.018	

ICU intensive care unit. *For comparison between patients with BSI and matched patients



RESEARCH Open Access

Relationship between ventilator-associated pneumonia and mortality in COVID-19 patients: a planned ancillary analysis of the coVAPid cohort

Saad Nseir[1,2*], Ignacio Martin-Loeches[3,4], Pedro Povoa[5,6], Matthieu Metzelard[7], Damien Du Cheyron[8],

2021

Planned ancillary analysis of a multicenter retrospective European cohort.

VAP was diagnosed using clinical, radiological and quantitative microbiological criteria.

Univariable and multivariable marginal Cox's regression models, with cause-specific hazard for duration of mechanical ventilation and ICU stay, were used to compare outcomes between study groups.
Extubation, and ICU discharge alive were considered as events of interest, and mortality as competing event.

	SARS-CoV-2 pneumonia	
	Alive ($n=402$)	Dead ($n=166$)
Age, years[a]	62 (53–70)	70 (62–78)
Men	281/402 (69.9)	126/166 (75.9)
Body mass index, kg/m^2 [b]	28.7 (25.5–33.6)	29.1 (26.0–33.0)
Severity scores		
SAPS II[c]	38 (31–51)	48 (38–61)
SOFA score[d]	6 (3–8)	7 (4–10)
Comorbidity scores		
MacCabe classification		
Non-fatal	347/382 (90.8)	128/161 (79.5)
Fatal < 5 years	33/382 (8.6)	29/161 (18.0)
Fatal < 1 year	2/382 (0.5)	4/161 (2.5)
Charlson Comorbidity Index[e]	2 (1–3)	4 (2–5)

RESEARCH Open Access

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Saad Nseir[1,2*], Ignacio Martin-Loeches[3,4], Pedro Povoa[5,6], Matthieu Metzelard[7], Damien Du Cheyron[8],

2021

Table 1 Patient characteristics at ICU admission according to disease group, and 28-day mortality

	SARS-CoV-2 pneumonia		Influenza pneumonia		No viral infection	
	Alive ($n=402$)	Dead ($n=166$)	Alive ($n=350$)	Dead ($n=132$)	Alive ($n=344$)	Dead ($n=182$)
Age, years[a]	62 (53–70)	70 (62–78)	61 (52–70)	65 (54–72)	63 (52–72)	70 (60–76)
Men	281/402 (69.9)	126/166 (75.9)	219/350 (62.6)	79/131 (60.3)	239/342 (69.9)	114/182 (62.6)
Body mass index, kg/m^2 [b]	28.7 (25.5–33.6)	29.1 (26.0–33.0)	27.5 (23.1–32.3)	27.6 (23.5–31.7)	26.3 (22.7–29.8)	26.9 (23.2–33.3)
Severity scores						
SAPS II[c]	38 (31–51)	48 (38–61)	48 (37–60)	58 (45–72)	51 (39–63)	63 (51–73)
SOFA score[d]	6 (3–8)	7 (4–10)	8 (5–10)	10 (7–13)	8 (5–11)	9 (7–12)
Comorbidity scores						
MacCabe classification						
Non-fatal	347/382 (90.8)	128/161 (79.5)	249/332 (75.0)	75/124 (60.5)	216/318 (67.9)	99/171 (57.9)
Fatal < 5 years	33/382 (8.6)	29/161 (18.0)	78/332 (23.5)	36/124 (29.0)	90/318 (28.3)	47/171 (27.5)
Fatal < 1 year	2/382 (0.5)	4/161 (2.5)	5/332 (1.5)	13/124 (10.5)	12/318 (3.8)	25/171 (14.6)
Charlson Comorbidity Index[e]	2 (1–3)	4 (2–5)	3 (2–5)	4 (2–6)	3 (2–5)	5 (3–6)

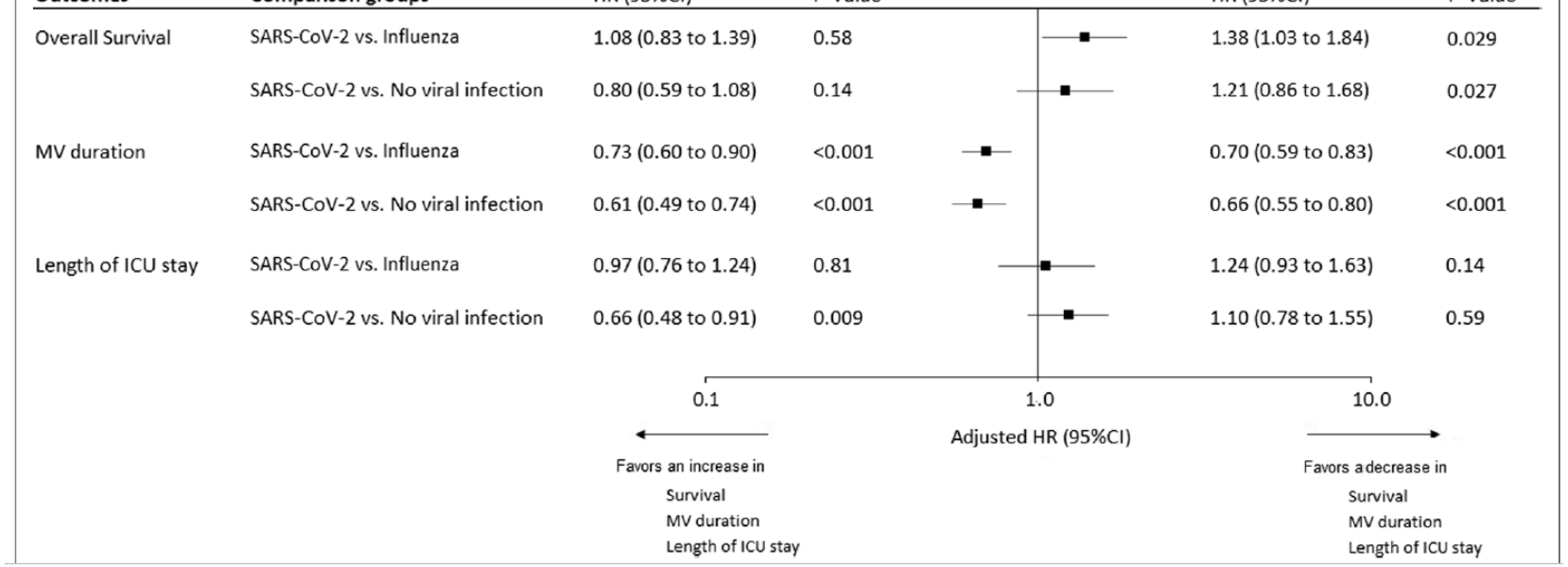
RESEARCH Open Access

Relationship between ventilator-associated pneumonia and mortality in COVID-19 patients: a planned ancillary analysis of the coVAPid cohort

Saad Nseir[1,2*], Ignacio Martin-Loeches[3,4], Pedro Povoa[5,6], Matthieu Metzelard[7], Damien Du Cheyron[8],

2021

Outcomes	Comparison groups	Undjusted HR (95%CI)	Undjusted P-Value	Adjusted HR (95%CI)	Adjusted P-Value
Overall Survival	SARS-CoV-2 vs. Influenza	1.08 (0.83 to 1.39)	0.58	1.38 (1.03 to 1.84)	0.029
	SARS-CoV-2 vs. No viral infection	0.80 (0.59 to 1.08)	0.14	1.21 (0.86 to 1.68)	0.027
MV duration	SARS-CoV-2 vs. Influenza	0.73 (0.60 to 0.90)	<0.001	0.70 (0.59 to 0.83)	<0.001
	SARS-CoV-2 vs. No viral infection	0.61 (0.49 to 0.74)	<0.001	0.66 (0.55 to 0.80)	<0.001
Length of ICU stay	SARS-CoV-2 vs. Influenza	0.97 (0.76 to 1.24)	0.81	1.24 (0.93 to 1.63)	0.14
	SARS-CoV-2 vs. No viral infection	0.66 (0.48 to 0.91)	0.009	1.10 (0.78 to 1.55)	0.59



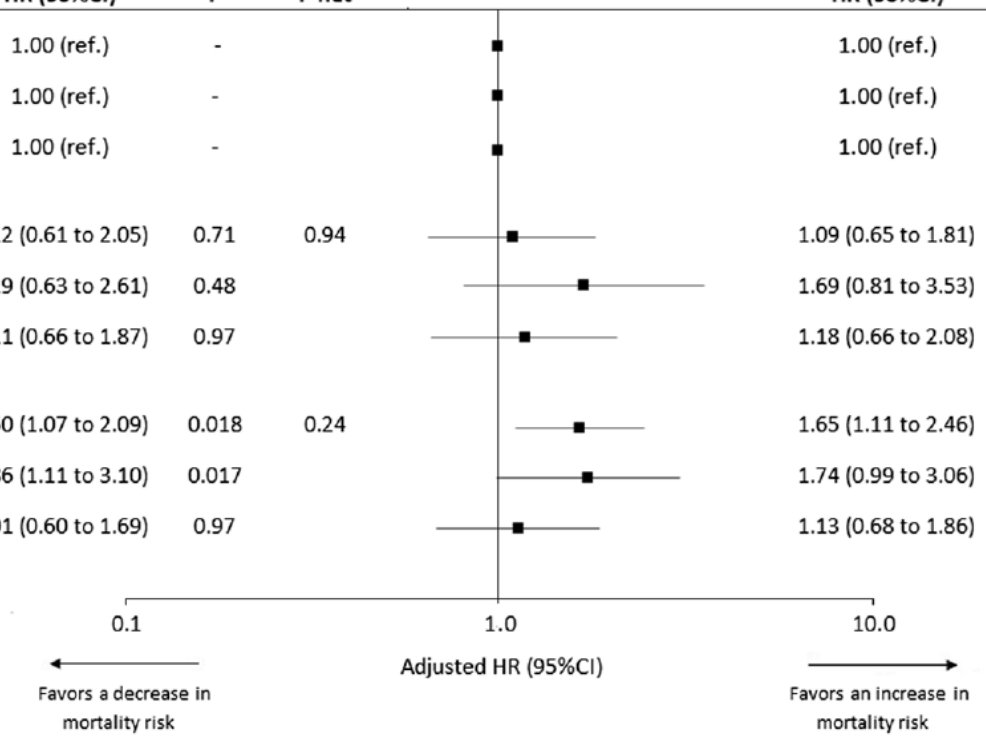
RESEARCH Open Access

Relationship between ventilator-associated pneumonia and mortality in COVID-19 patients: a planned ancillary analysis of the coVAPid cohort

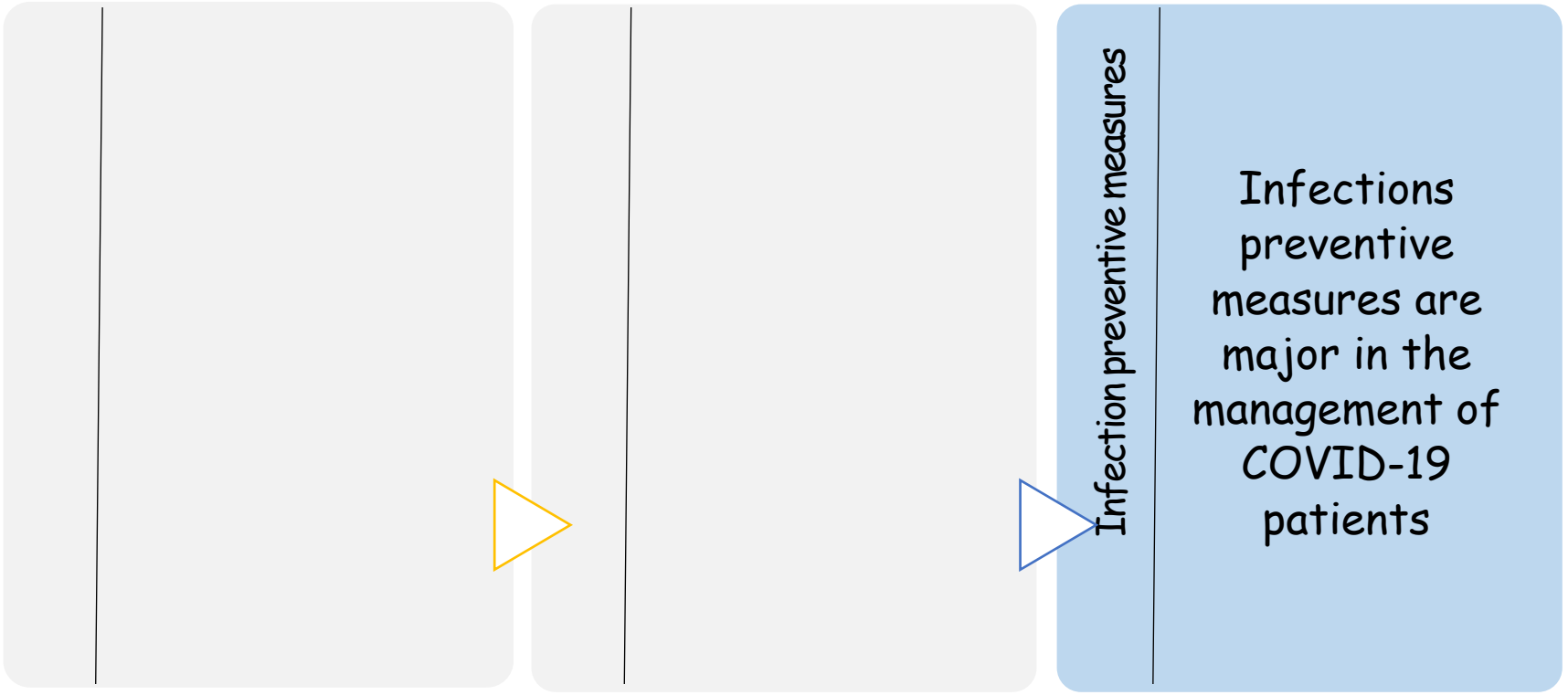
Saad Nseir[1,2*], Ignacio Martin-Loeches[3,4], Pedro Povoa[5,6], Matthieu Metzelard[7], Damien Du Cheyron[8],

2021

VA-LRTI	Group	Unadjusted HR (95%CI)	P	P het	Adjusted HR (95%CI)	P	P het
None	SARS-CoV-2	1.00 (ref.)	-		1.00 (ref.)	-	
	Influenza	1.00 (ref.)	-		1.00 (ref.)	-	
	No viral infection	1.00 (ref.)	-		1.00 (ref.)	-	
VAT	SARS-CoV-2	1.12 (0.61 to 2.05)	0.71	0.94	1.09 (0.65 to 1.81)	0.74	0.62
	Influenza	1.29 (0.63 to 2.61)	0.48		1.69 (0.81 to 3.53)	0.16	
	No viral infection	1.11 (0.66 to 1.87)	0.97		1.18 (0.66 to 2.08)	0.57	
VAP	SARS-CoV-2	1.50 (1.07 to 2.09)	0.018	0.24	1.65 (1.11 to 2.46)	0.013	0.42
	Influenza	1.86 (1.11 to 3.10)	0.017		1.74 (0.99 to 3.06)	0.052	
	No viral infection	1.01 (0.60 to 1.69)	0.97		1.13 (0.68 to 1.86)	0.63	



Rationale for using decontamination in patients with COVID-19



RESEARCH LETTER Open Access

Ventilator-associated pneumonia in critically-ill patients with COVID-19 in a setting of selective decontamination of the digestive tract

2021

Sinta B. van der Meer[1†], Grace Figaroa[1†], Peter H. J. van der Voort[1], Maarten W. Nijsten[1] and Janesh Pillay[1,2*]

Assessment of their practice of care, including SDD, and the associated incidence of VAP in patients infected with SARS-COV-2 and compared it to current literature.

A single center retrospective observational study in the University Medical Center of Groningen (UMCG), The Netherlands.

All adult patients consecutively admitted to our ICU **between March 2020 and February 2021** with PCR-confirmed COVID-19 were included.

Standard care with SDD included microbiological surveillance of respiratory samples, throat and rectal swabs at admission, and twice weekly thereafter.

All patients were retrospectively reviewed for presence of VAP.

SDD strategy

MOUTHPASTE
Topical polymyxin, tobramycin, and amphotericin B delivered in THROAT

SUSPENSION
Topical polymyxin, tobramycin, and amphotericin B delivered in GUT

AB IV
A 4-day course of cefotaxime

Strict standard precautions

Twice weekly surveillance cultures of throat and rectum

RESEARCH LETTER Open Access

Ventilator-associated pneumonia in critically-ill patients with COVID-19 in a setting of selective decontamination of the dig

Sinta B. van der Meer[1]

2021

Table 1 Characteristics of patients with and without VAP

	No VAP $n = 190$ (90%)	VAP[a] $n = 22$ (10%)	p value
Age	63 (56–70)	65 (54–23)	.75
Gender (female)	57 (30%)	4 (18%)	.32
BMI > 30	78 (41%)	7 (32%)	.49
Diabetes mellitus	54 (28%)	4 (18%)	.45
Hypertension	75 (40%)	9 (41%)	1.00
Chronic kidney disease	16 (8%)	0	.38
Chronic lung disease	25 (13%)	6 (27%)	.10
Immune compromised	24 (13%)	0	.14
SOFA-score	6 (4–7)	7 (4–7)	.26
Time to VAP (days)	na	12 (7–17)	
Use of SDD	189 (99.5%)	22 (100%)	1.00
Corticosteroids	118 (62%)	15 (68%)	.65
ECMO	12 (6%)	3 (14%)	.19
CRRT	24 (13%)	2 (9%)	1.00
Proning during MV	107 (56%)	19 (86%)	.006
Length of MV (days)	13 (8–21)	26 (15–33)	< 0.0001
Length of ICU stay (days)	15 (9–22)	25 (21–35)	< 0.0001
ICU mortality	57 (30%)	9 (41%)	.33

Data are reported as median (IQR-range) or n (%). p values were calculated using Mann–Whitney U test and Chi-Square test in SPSS

[a] Positive cultures contained *S. aureus* ($n = 7$), *P. aeruginosa* $n = 4$), *S. marcescens* ($n = 3$), *S. paucimobilis* ($n = 2$), *K. pneumoniae* ($n = 2$), *E. coli*, *P. agglomerans*, *A. fumigatus* and *Proteus mirabilis*. Low pathogenic bacteria (enterococci and bacillus) were excluded from our VAP definition

LETTER

Absence of candidemia in critically ill patients with COVID-19 receiving selective digestive decontamination

Jochem B. Buil[1,2,3*], Jeroen A. Schouten[2,3,4], Joost Wauters[5], Hans van de Hoeven[4] and Paul E. Verweij[1,2,3] on behalf of CAC-SDD study group

Assessment of the frequency of COVID-19 associated candidemia (CAC) in critically ill patients in a tertiary care university medical center in Netherlands

ICU, patients with an anticipated admission duration of > 3 days or mechanical ventilation for > 2 days receive selective decontamination of the gastrointestinal tract (SDD)

Over a 30-month period (March 2020–November 2021).

.

SDD strategy

MOUTHPASTE
Topical polymyxin, tobramycin, and amphotericin B delivered in THROAT

SUSPENSION
Topical polymyxin, tobramycin, and amphotericin B delivered in GUT

AB IV
A 4-day course of cefuroxime

Strict standard precautions

Twice weekly surveillance cultures of throat and rectum

LETTER

Absence of candidemia in critically ill patients with COVID-19 receiving selective digestive decontamination

Jochem B. Buil[1,2,3*], Jeroen A. Schouten[2,3,4], Joost Wauters[5], Hans van de Hoeven[4] and Paul E. Verweij[1,2,3] on behalf of CAC-SDD stu

Table 1 Characteristics of the COVID-19 cohort

Number of patients	378
Age, mean (range)	61 (16–93)
Apache II score, mean (range)	17.0 (1–38)
Mean duration of ICU stay per patient (days)	18.8 (1–89)
Number of patients with ICU stay of < 5 days	62 (16%)
Number of patients receiving SDD	352 (93%)
Number of patients with diabetes	79 (21%)
Number of patients with central vascular catheter	310 (82%)
Number of patients on mechanical ventilation	309 (82%)
Number of patients with renal replacement therapy	45 (12%)
Number of patients receiving IL6- inhibitors	188 (50%)
Number of patients receiving dexamethasone	274 (72%)
Number of blood culture sets (aerobic/anaerobic), mean per patient during ICU stay	6.5 (0–31)
Number of patients with *Candida* colonization	199 (53%)
Median time to *Candida* decolonization (days)	7 (1–53)

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Letter to the Editor

Selective digestive decontamination to reduce the high rate of ventilator-associated pneumonia in critical COVID-19

D. Luque-Paz, P. Tattevin, P. Jaubert et al.

A retrospective observational study in two French ICUs (Rennes and Angers University Hospitals) with low baseline MDRGNB rates to compare the incidence of VAP with or without routine use of SDD..

All patients with documented COVID-19, mechanically ventilated for longer than 48 h between the 1st of January and the 31st of December 2020.

In one centre (Rennes), multiple site decontamination wasroutinely used SDD.

In the other centre (Angers), no topical antibiotics were used, and systemic antibiotics were prescribed only if bacterial infection was suspected, at the discretion of the attending physician.

RENNES

MULTIPLE SITE DECONTAMINATION (MDS)

SOD		MOUTHPASTE (whole duration of MV) Topical polymyxin, tobramycin, and amphotericin B delivered in THROAT
SDD strategy		SUSPENSION (whole duration of MV) Topical polymyxin, tobramycin, and amphotericin B delivered in GUT
		AB IV A 5-day course of cefotaxime
		Strict standard precautions
		Twice weekly surveillance cultures of throat and rectum
Skin bathing	Universal MSSA/MRSA eradication	Once daily chlorhexidine body wash
Nasal decontamination	Universal MSSA/MRSA eradication	2% mupirocin ointment intranasally 2/day

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Letter to the Editor

Selective digestive decontamination to reduce the high rate of ventilator-associated pneumonia in critical COVID-19

D. Luque-Paz, P. Tattevin, P. Jaubert et al.

178 consecutive patients with critical COVID-19 who required mechanical ventilation in ICU longer than 48 h.

Table 1
Baseline characteristics and clinical course according to SDD use.

Characteristics	SDD group, n = 77	No SDD group, n = 101	*P*-value
Age, median [IQR]	66 [55–72]	68 [62–74]	0.03
Male gender, n (%)	60 (78)	75 (74)	0.73
SAPS-2 score at admission, median [IQR]	37 [28–45]	42 [33–50]	0.03
Inter-hospital transferred patients, n (%)	18 (23)	18 (18)	0.45
Extracorporeal membrane oxygenation support, n (%)	8 (10)	19 (19)	0.14
At least one VAP, n (%)	16 (21)	50 (50)	< 0.001
VAP incidence (per 1000 ventilator days)	9.4	23.5	< 0.001
VAP microbiological documentation, n			
Enterobacteriaceae	14	29	
H. influenzae	0	7	
P. aeruginosa	4	6	
A. baumannii	0	2	
S. aureus	0	11	
Other	1	3	
Bloodstream infection, n (%)	10 (13)	17 (17)	0.53
Length of mechanical ventilation, days	14 (8–28)	15 (9–29)	0.75
28-day mortality, n (%)	5 (6.5)	22 (21.8)	0.01[a]

[a] After adjustment for age, gender, SAPS-2 and extracorporeal membrane oxygenation support, the hazard ratio for death in the SDD group was 0.33, 95% CI [0.12–0.87]; *P* = 0.03.

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Letter to the Editor

Selective digestive decontamination to reduce the high rate of ventilator-associated pneumonia in critical COVID-19

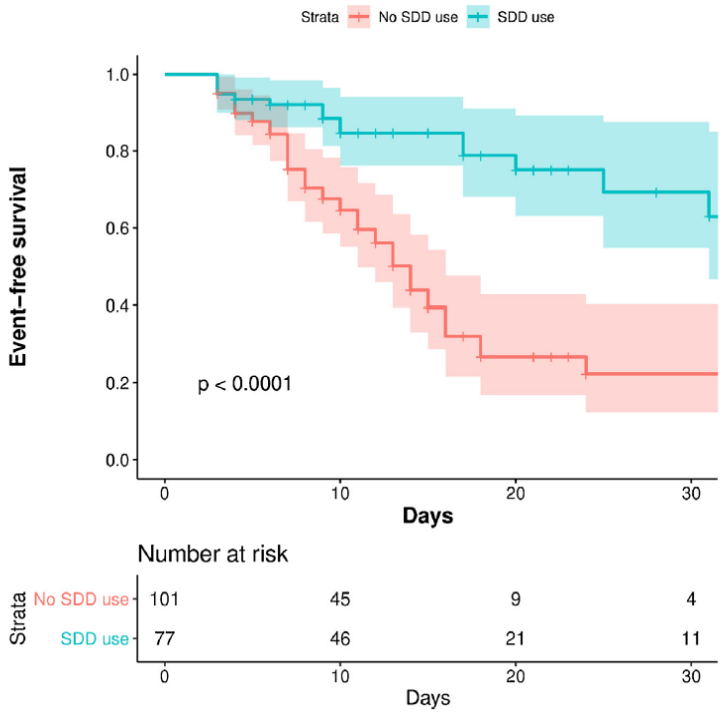

Fig. 1. Kaplan-Meier estimate of the probability of remaining free from VAP in patients with critical COVID-19.

BSI rate was similar between the 2 groups (13% vs. 17%).

VAP incidence was lower in the SDD group than in the group without SDD (9.4 vs. 23.5 per 1000 ventilator days.

Table 2
Multivariate analysis of predictive factors of ventilator-acquired pneumonia.

Ventilator-acquired pneumonia	Patients with VAP (n = 66)	Patients w/o VAP (n = 112)	*P*-value	Adjusted HR (95% CI)	*P*-value
Age,[a] median [IQR]	67 [59–72]	67 [58–75]	0.71	1.01 (0.99–1.04)	0.41
Male gender,[a] n (%)	58 (88)	76 (68)	0.01	2.70 (1.27–5.74)	0.01
SAPS-2 score at admission, median [IQR]	40 [33–49]	38 [30–48]	0.82		
ECMO support,[a] n (%)	18 (27)	9 (8)	< 0.001	2.3 (1.24–4.10)	0.008
Inter-hospital transferred patients, n (%)	12 (18)	24 (21)	0.52		
SDD use, [a] n (%)	16 (24)	61 (54)	< 0.001	0.36 (0.20–0.63)	< 0.001

SAPS-2 = simplified acute physiology score; ECMO = extracorporeal membrane oxygenation; SDD = Selective digestive decontamination.
[a] Variables included in the multivariate analysis.

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Long-term survival of mechanically ventilated patients with severe COVID-19: an observational cohort study

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AIC Annals of Intensive Care 2021

Retrospective, multicentre, national cohort study between March 8 and April 30, 2020 in 16 intensive care units (ICU) in Spain.

Participants were consecutive adults who received invasive mechanical ventilation for COVID-19.

The primary outcomes was 180-day survival after hospital admission.
A predictive model was developed to estimate the probability of 180-day mortality.

Charateristic	Odds ratio (95% CI) for 180-day mortality
Age	1.05 (1.04, 1.07)
Diabetes mellitus	1.56 (1.10, 2.23)
SAPS3	1.34 (1.32, 1.36)
Neutrophil to lymphocyte ratio	1.01 (1.00, 1.02)
Noninvasive respiratory support prior to orotracheal intubation	
Oxygen mask	1 (Reference)
High flow nasal cannula	1.11 (0.66, 1.84)
Noninvasive ventilation	1.90 (1.14, 3.16)
Noninvasive ventilation & High flow nasal cannula	2.01 (0.74, 5.47)
Selective Digestive Decontamination strategy	0.60 (0.37, 0.96)
Administration of corticosteroids	
No	1 (Reference)
Methylprednisolone < 1mg/kg	2.04 (1.20, 3.46)
Methylprednisolone ≥ 1mg/kg	0.96 (0.68, 1.35)

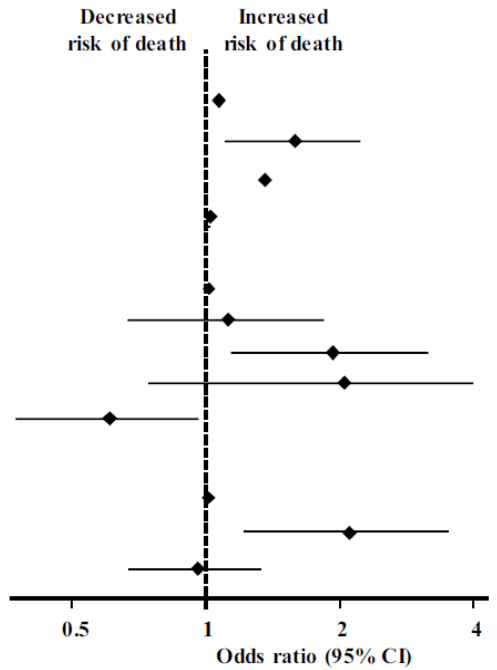

Fig. 2 Multivariable-adjusted risk model for death at 180 days and forest plot

N = 868

RESEARCH Open Access

Multiple-site decontamination regimen decreases acquired infection incidence in mechanically ventilated COVID-19 patients

Nicolas Massart[1*†], Florian Reizine[2,3†], Pierre Fillatre[1], Philippe Seguin[4], Béatrice La Combe[5], Aurélien Frerou[6], Pierre-Yves Egreteau[7], Baptiste Hourmant[8], Pierre Kergoat[9], Julien Lorber[10], Jerome Souchard[3,2], Emmanuel Canet[11], Guillaume Rieul[3], Yannick Fedun[3], Agathe Delbove[3†] and Christophe Camus[2†]

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IF 2020 6.925
AIC
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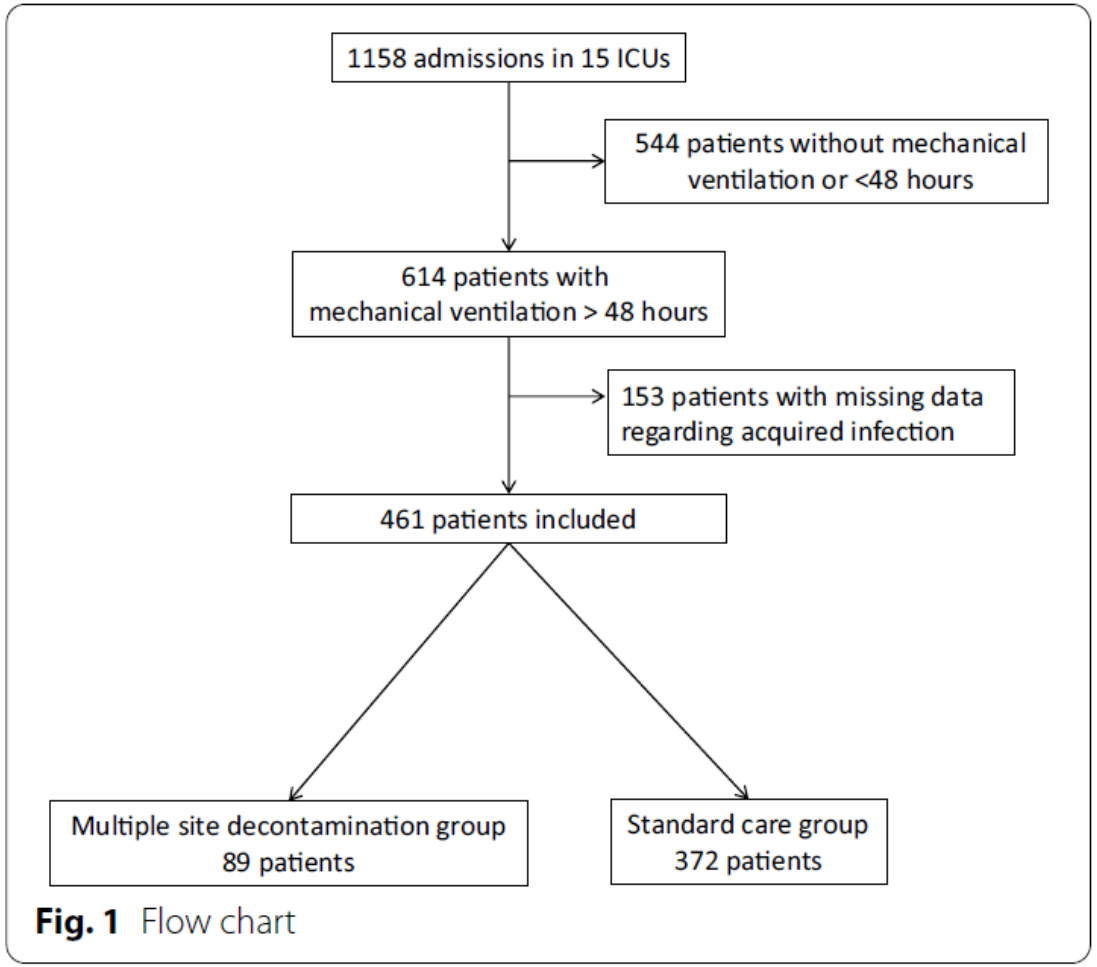

Fig. 1 Flow chart

An ancillary analysis of a multicenter retrospective observational study in 15 ICUs in western France **(COCOREVAP cohort)**

3 ICUs used multiple site decontamination (MSD) throughout the duration of intuibation

- topical antibiotics four times daily in the oropharynx and the gastric tube,
  - Tobramycin, 300/d in Rennes or gentamicin, 543 mg/day
  - Colistine sulfate, 400/d
  - Amphotericin B 2g/d
- chlorhexidine body wash once daily
- and a 5-day nasal mupirocin course.

12 ICUs used standard-care (SC)

AIs were compared between the 3 ICUs using MSD (MSD group) and the 12 ICUs using SC (SD group).
To draw unbiased marginal estimates of exposure effect, a propensity-score matched analysis was performed,

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There were 34 AIs in the MSD group (2117 patient-days), as compared with 274 AIs in the SC group (8957 patient-days) ($p < 0.001$).

MSD was independently associated with a lower risk of AI (IRR = 0.56 [0.38–0.83]; $p = 0.004$).

When the same model was used for each site of infection, MSD remained independently associated with a lower risk of VAP (IRR = 0.52 [0.33–0.89]; $p = 0.005$) but not of BSI (IRR = 0.58, [0.25–1.34], $p = 0.21$).

Hospital mortality was lower in the MSD group (16.9% vs 30.1%, $p = 0.017$).

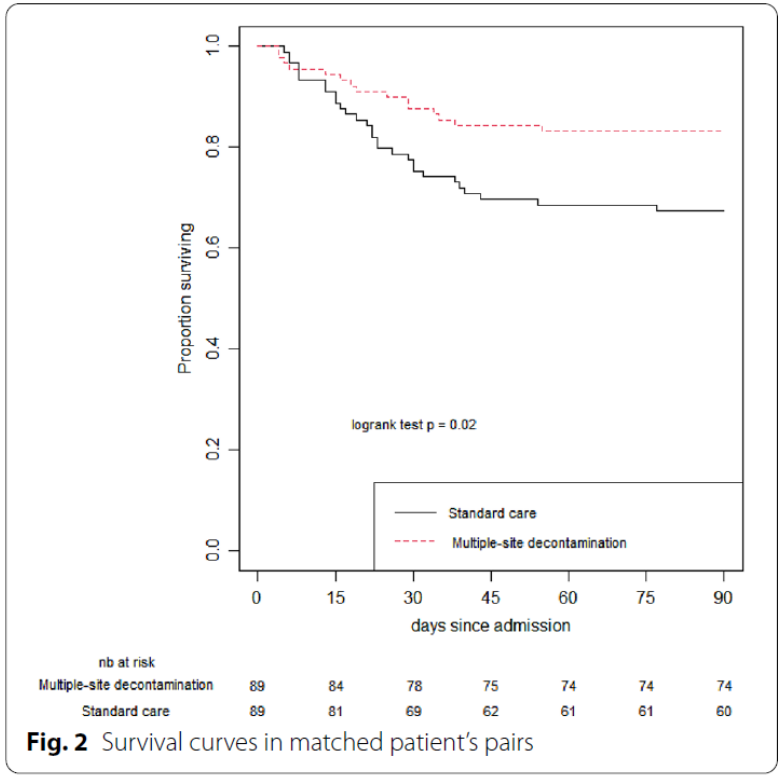

Fig. 2 Survival curves in matched patient's pairs

Rationale for using decontamination in patients with COVID-19