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Three years application of selective digestive decontamination in a mixed intensive care unit in a university hospital: impact on colonization, infection and antibiotic consumption

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Objectives

To prospectively evaluate the impact after 3 years of Selective Digestive Digestive (SDD) application on colonization, infection and antibiotic consumption in an ICU.

Methods

This study was conducted in a 30-bed-medical-surgical ICU. All consecutive patients admitted to the from October 1, 2011 to September 30, 2014 expected to require tracheal intubation for longer than 48 hours were given SDD (SDD study group) with a 4-day course of intravenous cefotaxime, plus enteral colistin, tobramycin, nystatin in an oropharyngeal paste and in a digestive solution. Oropharyngeal and rectal swabs were obtained on admission and once weekly. Nosocomial infections were diagnosed by CDC criteria. We compared all patients admitted to ICU who acquired nosocomial ICU colonization and infection from October 1, 2010 to September 30, 2011 (non-SDD group) to SDD group. In both groups, categorical variables were summarized as frequencies and percentages and the continuous ones as means and standard deviations when the data followed the normal distribution or medians and interquartile ranges when they did not. The percentages were compared using the test of chi-square test or Fisher exact test, means with the t-test and medians with the Wilcoxon test for independent samples. Those variables that showed statistical significance in the univariate analysis were introduced in a multivariate logistic regression analysis. For each one of the acquired infections (catheter-related and other secondary bacteremias, pneumonia and urinary infections and antibiotic resistant bacteria (ARB) infection) the incidences per 1000 days of exposure in each cohort and the corresponding relative risks were obtained using the Poisson regression. Statistical significance was set at $p \leq 0.05$. We also analized colistin and tobramycin resistant colonization and antibiotic consumption (Defined Antibiotics daily Doses (DDD)).

Results

Results are shown in Figures 1, 2, 3.

There were no statistical significant differences between both groups in type of ICU admission or demographic data. Patients with SDD had significantly less ESBLs and *Acinetobacter spp*. We had also a significant reduction in nosocomial pneumonias, urinary tract infections and other secondary bacteremias and ARB rates in SDD group versus non SDD. There was no infections by Clostridium difficile. The exogenous infections were 84,2%. Colistin resistant colonization was 10,3% and tobramycin resistant colonization was 15,8% out of 253 samples of the studied patients. There was a decrease on the DDD/100 ICU stays during SDD.

Conclusions

After 3 years applying SDD a significant reduction of infections by ESBL and *Acinetobacter* was observed. A significant decrease of nosocomial pneumonia, urinary infections and secondary bacteremias and ARB infections rates was shown. An antibiotic consumption reduction was shown compared to the non-SDD group. Colistin

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	SDD		
	No N = 110	Si N = 182	P
Age, years	59.5 ± 15.8	60.7 ± 15.9	.545
Male / Female, %	67.3 / 32.7	63.7 / 36.3	.539
Apacho II			
Glasgow Coma Score	21.2 ± 7.7	22.3 ± 7.7	.260
	15 (8 ; 15)	14 (9 ; 15)	.104
Patients			.641
Medical	79 (71.8)	127 (69.8)	
Scheduled surgery	10 (9.1)	23 (12.6)	
Emergency surgery	21 819.1)	32 (17.6)	
Inflammatory response			< .001
No	2 (1.8)	10 (5.5)	
Sepsis	23 (20.9)	55 (30.2)	
Severe sepsis	34 (30.9)	18 (9.9)	
Septic Shock	51 (46.4)	99 (54.4)	
Previous surgery, n (%)	22 (20.0)	48 (26.4)	.216
Urgent surgery, n (%)	34 (30.9)	55 (30.2)	.901
Traumatic patient, n (%)	17 (15.5)	23 (12.6)	.497
Catheter related bacteremia , n (%)	26 (23.6)	70 (38.5)	.009
Secondary bacteremia, n (%)	31 (28.2)	34 (18.7)	.059
Nosocomial pneumonia, n (%)	59 (53.6)	73 (40.1)	.024
Diabetes mellitus, n (%)	34 (30.9)	56 (30.8)	.980
Urinary infection n (%)	29 (26.4)	53 (29.1)	.611
Renal failure, n (%)	40 (36.4)	47 (25.8)	.056
Coronary artery disease patient, n (%)	19 (17.3)	30 (16.5)	.861
RRT, n (%)	34 (30.9)	64 (35.2)	.456
Parenteral nutrition, n (%)	26 (23.6)	42 (23.1)	.913
Immunosuppression, n (%)	8 (7.3)	15 (8.2)	.766
Alcholic patientl, n (%)	9 (8.2)	22 (19.5)	.015
ICU stay, days	28 (16 ; 45)	32 (17 ; 48)	.429
Deaths, n (%)	36 (32.7)	57 (31.5)	.827
Acinetobacter spp., n (%)	13 (11.8)	3 (1.6)	< .001
ESBL, n (%)	38 (34.5)	38 (20.9)	.001
Pseudomonas, MR n (%)	10 (9.1)	15 (8.2)	.802
GNB MR, n (%)	12 (10.9)	7 (3.8)	.018
MRSA, n (%)	4 (3.6)	4 (2.2)	.480

SDD: Digestive Selective Decontamination; n: number; RRT: Renal Replacement Therapy, ESBL: Extended Spectrum Betalactamase; MR: Multi-resistant.;GNB ; Gram Negative Bacteria; MRSA: Methicillin Resistant Staphyloccocus Aureus.

Figure 1 Univariate analysis.

Covariate	Logistic coefficient	Standard error	p-value	Odds ratio	95% CI
CRB	0.728	0.284	.010	2.070	1.187 ; 3.611
Acinetobacter spp.	-2.007	0.661	.002	0.134	0.037 ; 0.491
ESBL	-0.826	0.284	.004	0.438	0.251 ; 0.764

CRB: Catheter Related Bacteremia; CI: Confidence Interval; ESBL: Extended Spectrum Betalactamase

Figure 2 Multivariate analysis.

	SDD			
	No	Yes	P	RR (95% CI)
Pneumonias/ 1000 days MV	9.65	4.22	**< .001**	0.444 (0.315 ; 0.626)
Urinary infection/1000 days urinary catheter	3.33	2,13	**.052**	0.638 (0.406 ; 1.004)
CRB /1000 days CVC	3.59	3.17	.479	0.851 (0.546 ; 1.329)
Secondary bacteremias./1000 days ICU	3.38	1.27	**<..001**	0.377 (0.232 ; 0.613)
Nº ARB infections./1000 days in ICU	9.48	2.70	**<..001**	0.281 (0.206 ; 0.384)

SDD: Selective Digestive Decontamination;RR: Relative Risk; CI: Confidence Interval; MV: Mechanical Ventilation; CBR: Catheter Related Bacteremia; ARB: Anibiotic Resistant Bacteria

Figure 3 Nosocomial infection rates.

and tobramycin resistant colonization bacteria were also described.

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