

Incidence of infection after colonization with multidrug resistant Gram-negative organisms

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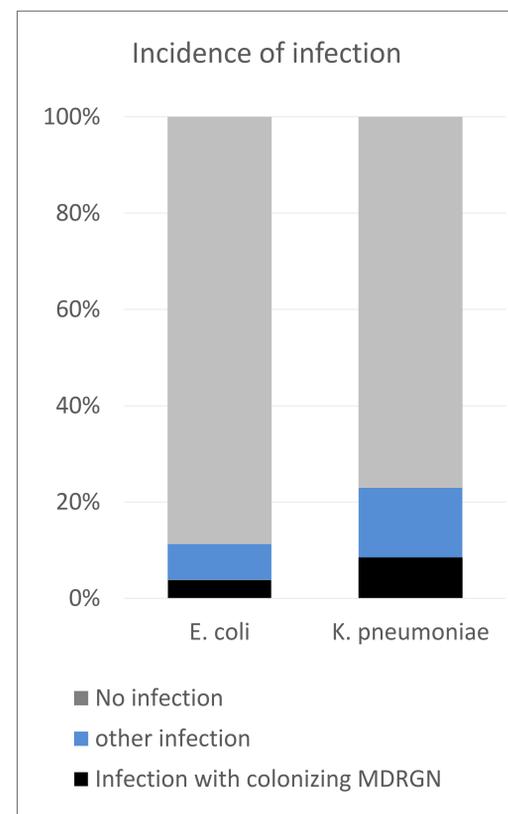
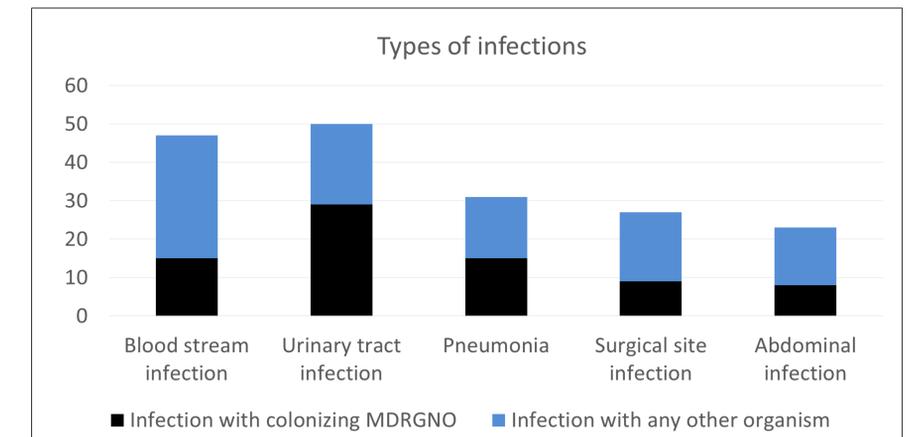
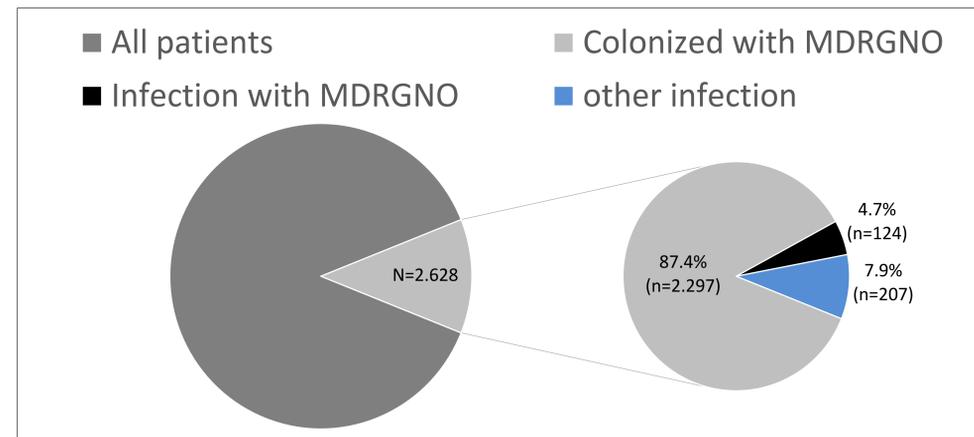
Background: The number of patients colonized with multidrug resistant Gram-negative organisms (MDRGNO) is growing world-wide. Subsequent infections with these organisms are associated with limited treatment options and elevated mortality and morbidity. With additional and costly prevention measures hospitals are trying to prevent these infections. But how often do these patients develop an infection with MDRGNOs compared to infections with other bacteria and what are the risk factors. Within a hospital setting we aimed to determine the incidence of these MDRGNO infections as well as the risk factors associated with these infections after rectal MDRGNO colonization.

Methods: The setting of this study was a German university hospital with over 3.200 beds. The study period was two years (2014 and 2015). We included all patients that were found rectally colonized with multidrug resistant *Escherichia (E.) coli* or *Klebsiella spp.* and subsequently stayed at least 3 days in our hospital. The patients were then prospectively tracked, looking for microbiological examination indicating a possible infection. Cases were manually reviewed by infection control professionals to identify a new infection with either the colonization organism or any other organism. In order to analyze risk factors for a bacterial infection we conducted a nested case-case-control study. Cases were either MDRGNO infections or infections with any other bacteria, controls were patients without bacterial infection with an onset between MDRGNO colonization and hospital discharge. Data were analyzed using univariate and multivariate regression models.

Results: Within the study period 2,628 patients fulfilled the inclusion criteria. The patients were found to be colonized with the following MDRGNOs: *E.coli* 82.1% (n=2,157), 17.9% (n=471), *K. pneumoniae*. Of these patients 4.7% (n=124) developed a bacterial infection with the colonizing MDRGN bacteria and 7.8% (n=207) with any other bacteria different from the colonizing bacterium (p<0.001). The risk factors for a bacterial infection after colonization were recent use of urinary catheter, recent surgical procedure affecting the intestine and use of systemic corticosteroids. There were no difference in risk factors between infections with the colonizing MDRGNO and infections due to other organisms.

Conclusions: Patients colonized with MDRGNO do not have an increased risk for nosocomial MDRGNO infection compared to any other bacterial infection. Therefore, in the light of increasing colonization rates, it is even more important to establish an excellent standard hygiene culture in each hospital in order to prevent also MDRGNO infections.

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Univariate analysis of risk factors for infection after colonization: results of relevant parameter (p<0.100)

Parameter	No infection (n=207)	Infection with colonizing MDRGNO (n=76)	P-value	Other infection (n=103)	P-value
Central venous catheter	38%	57%	0.003	60%	<0.001
Dialysis	14%	22%	0.097	15%	n.n
Urinary catheter	50%	68%	0.003	68%	0.004
Surgery intestine	9%	25%	<0.001	21%	0.003
Surgery other	47%	62%	0.085	54%	n.s.
Corticosteroid use	17%	34%	0.006	35%	0.004
Colistin	1%	-	n.s.	4%	0.085
Clindamycin	2%	1%	n.s.	6%	0.054

Multivariate analysis of risk factors for other Infections

	P-value	OR	CI 95	
			Lower	Upper
Central venous catheter	0,024	1,851	1,084	3,160
Surgery intestine	0,025	2,314	1,110	4,827

Multivariate analysis of risk factors for Infections with the colonizing MDRGNO

	P-value	OR	CI 95	
			Lower	Upper
Urinary catheter	0,037	1,937	1,040	3,606
Surgery intestine	0,007	2,945	1,348	6,433
Corticosteroid use	0,001	2,897	1,525	5,503