

Multidrug resistant bacteria (MDRB) and bed turnover: is it true that the fragile patient should be moved the least possible?

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Introduction

- Multidrug resistant bacteria (MDRB) are a major threat to Intensive Care Unit (ICU) patients.
- Beds cleaning is a key factor in infection prevention and control (IPC).
- Our aim was to investigate whether bed turnover could affect the quality and prevalence of MDRB.

Study Design

- We conducted a retrospective study on patients hospitalized between the 1st November 2023 and the 30th January 2024 in our 23-beds-ICU, Sassari, Italy.
- ICU beds are divided in those dedicated to medical (n.1-7), surgical (n.11-15), and COVID-19 (n.20-24) patients.
- All other beds (9, 10, 16, 17, 18, 19) are meant for isolation.

Methods

- Bed turnover, MDRB findings, patient's outcome and length of ICU stay (LOS_{ICU}) were analyzed.
- Qualitative and quantitative analysis was performed.



Results

Overall, 137 bed occupants were identified in the study period (Table 1).

Table 1. ICU beds' occupants MDRB findings, mean length of ICU stay (LOS_{ICU}) and associated mortality

	ICU Beds				
	Overall	Medical (1-7)	Surgical (11-15)	COVID-19 (20-24)	Isolation (9, 10, 16, 17, 18, 19)
Total bed occupants (n, %)	137	45 (32.9%)	60 (43.8%)	12 (8.8%)	20 (14.6%)
MDRB carriers (n, %)					
Overall	43 (31.4%)	18 (41.9%)	5 (11.6%)	4 (9.3%)	16 (37.2%)
Only AB	8 (18.6%)	4 (50%)	1 (12.5%)	0	3 (37.5%)
Only KPC	10 (23.3%)	6 (60%)	2 (20%)	0	2 (20%)
Only VRE	6 (14%)	2 (33.3%)	2 (33.3%)	2 (33.3%)	0
AB+KPC	7 (16.3)	2 (28.6%)	0	0	5 (71.4%)
AB+VRE	5 (11.6%)	3 (60%)	0	0	2 (40%)
KPC+VRE	4 (9.3%)	1 (25%)	0	1 (25%)	2 (50%)
AB+KPC+VRE	3 (7%)	0	0	1 (33.3%)	2 (66.7%)
Total AB^a	24 (55.8%)	9 (37.5%)	1 (4.2%)	1 (4.2%)	13 (54.2%)
Total KPC^a	26 (60.5%)	9 (34.6%)	2 (7.7%)	2 (7.7%)	13 (50%)
Total VRE^a	20 (46.5%)	6 (30%)	2 (10%)	4 (20%)	8 (40%)
Mean LOS_{ICU} MDRB carriers (days, SD)					
Mean LOS_{ICU} AB	51 (±23)	50 (± 26)	3	38	54 (± 25)
Mean LOS_{ICU} non-AB	15 (±13)	14 (±7)	8 (± 3)	13 (± 9)	30 (±10)
Death rate (n, %)					
Overall	43/137 (31.4%)	18/45 (40%)	9/60 (15%)	7/12 (58.3%)	9/20 (45%)
AB	4/8 (50%)	2 (50%)	0	0	2 (50%)**
KPC	4/10 (40%)	4 (100%)	0	0	0
VRE	2/6 (33.3%)	1 (50%)**	1	1 (50%)**	0
AB+KPC	1/7 (14.3%)	1 (100%)	0	0	0
AB+VRE	2/5 (40%)	1 (50%)	0	0	1 (50%)
KPC+VRE	2/40 (40%)	0	0	1 (50%)**	1 (50%)**
AB+KPC+VRE	2/3 (66.6%)	0	0	0	2 (100%)**

AB: Acinetobacter baumannii; KPC: Klebsiella pneumoniae carbapenemase-producing ; ICU; Intensive Care Unit; LOS_{ICU}: Length of ICU stay; MDRB: multidrug resistant bacteria; VRE: Vancomycin Resistant Enterococci.

^a The same patient could be carrier of more than one MDRB. ** Same patient transferred from one bed to another

OVERALL MDRB

- Of all MDRB carriers (43/137, 31.4%), 26 (60.5%) were *Klebsiella pneumoniae* carbapenemase-producing (**KPC**) bacteria carriers, 24 (55.8%) *Acinetobacter baumannii* (AB) carriers, and 20 (46.5%) *Vancomycin Resistant Enterococci* (VRE) carriers in at least one between rectal, blood, urine or respiratory samples.
- All of them were more commonly **co-present** with each other (KPC 14/26, 53.8%; AB 14/24, 58.3%; VRE 12/20; 60%) rather than alone.
- The most common association was **AB+KPC** (7/19, 36.8%), followed by AB+VRE (5/19, 26.3%), KPC+VRE (4/19, 21.1%), and AB+KPC+VRE (3/19, 15.8%).

OVERALL TURNOVER

- **Surgical beds** had the greatest turnover (10-13 patients in 3 months), accounting for the majority of patients (60/137, 43.8%), followed by medical ones (8-5 patients in 3 months, 45/137, 32.9%), and isolation ones (5-2 patients in 3 months, 20/137, 14.6%).
- Surgical bed occupants had the **least MDRB findings**, and the **least death rate**, both absolute and MDRB-related.
- **AB carriers** had **3-times** the mean LOS_{ICU} compared to non-AB MDRB carriers in all beds, except from surgical ones.

MDRB ACCORDING TO BEDS

- Most beds carrying MDRB patients were **medical** (18/43, 41.7%), and not isolation beds (16/43, 37.2%).
- **KPC- and AB- alone** carriers were mainly identified in medical beds (60% and 50% of the total), while VRE-alone carriers were equally distributed with the exception of isolation beds (0/6).
- Considering associations, AB+VRE was prevalent in medical (3/5, 60%), and isolation beds (2/5, 40%), while AB+KPC in isolated patients (5/7, 71.4%).

Conclusion

- Our data suggest that medical beds, although having a fair turnover rate, are subject to higher rates of AB carrying and mortality compared to patients in isolation beds, surgical and COVID-19 beds.
- This study provides a hint for intensivists for not to underestimate IPC measures in non-isolated medical patients.

References

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