Review Article

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Residents of Long Term Care Facilities Detected As an Important Source of Multidrug Resistant Organisms For Patients of A Covid 19 Hospital From Bucarest, Romania, 2020

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Introduction

Despite the concern that Covid 19 will have the effect of cutting down on activities aimed at reducing the transmission of pathogens in hospital in this study we want to show the results of active microbiological surveillance (AMS) conducted in our 490-bed hospital designated as first line Covid 19 in 2020 in Bucharest, Romania.

Methods

Type study: unicenter, 1:2 case-control study. Study population: included in the study were 459 SARS-CoV-2 PCR positive patients discharged in 2020 from our 490 Covid 19 hospital, and found by screening with recommended AMS techniques as MDRO carriers when he/she found in one of the following mutually excluded circumstances (sources) : (a) transfer from another hospital (HOSP), (b) transfer from a long-term care facility (LTCF), (c) admitted in ICU from an nonICU ward (WARD) of our hospital, or (d) with a history of chronic hemodialysis (DIAL) [1,2].

For the case-control study for each MDRO positive case two nonMDRO cases (having the same gender and age (+/- 2 years) with the index case) were attached to form a group in which each member received the same alphanumeric code. The Analysis module of the EpiInfo 7 software was used to explore the magnitude of the association between the contemplated sources and the MDRO carrier status [3].

Results

Of all the 459 patients screened, 135 (24.9%) were detected as all type MDRO carriers. By species the frequencies of carriers were as follows: MRSA (#28), *Enterobacteriaceae* producing ESBL (#6), *Enterobacteriaceae* producing carbapenemase (#4), carbapenem resistant *Pseudomonas aeruginosa* (#11), carbapenem resistant *Acinetobacter baumannii* (#53) and vancomycin resistant *Enterococcus faecium* (#24).

There were no significant differences (p : 0.1772) between the mean age (SD) of MDRO carriers [(67.1 years) (16.9)] and MDRO

negative screened patients [(64.9 years) (15.21)]. Also among the 136 MDRO carriers there were no significant difference between the prevalence of male gender (25.2 %) and female gender (25.0%) respectively (Relative Risk:: 1.0058; 95%CI (0.79 – 1.27); 2 tail p : 0.9520).

Analysis, by conditional logistic regression, of all 4 sources studied revealed as statistically significant sources of MDRO only the LTCF [(Odds Ratio (OR): 4.01; 95% C.I.: (1.69 – 9.49; p value: 0.0016)) and DIAL (OR: 3.74; 95%CI: (1.16 – 11.98); p : 0.0266).

However the conditional logistic regression of only LTCF and DIAL sources indicated LTCF as the most important source of MDRO (see Table below)

Table 1: multivariate analysis of sources of MDRO in Covid 19 patients, 2020. (conditional logistic regression)

Term	Odds Ratio	95% C.I.	Coefficient	Z-Stat	P value
LTCF	2.6882	1.4211 – 5.0496	0.9889	3.0743	0.0021
DIAL	2.5131	0.9498 – 6.8666	0.9215	1.7969	0.0724

Comment

Our data suggests that in Covid 19 hospitals conducting of AMS was of crucial importance as it detected a rate of 30% MDRO carriage and also identified LTCF as the most effective sources of MDRO. The frequently older, sicker residents cared for in LTCFs, have a variety of risk factors for colonization and infection by MDRO. Pathogen cross-transmission within LTCFs is a significant issue and residents of these facilities are frequently moved between the acute and the long-term care settings [4-6].

Our results confirm the data reported by Marchaim and colleagues on LTCF as the main source of MDRO in acute care hospitals (Marchaim). For prevention of importing the MDRO in acute care

hospitals we recommend that patients transferred from the LTCF to acute-care hospitals should be considered to be at high risk of carrying resistant organisms and should be screened on admission. Screening should include a rectal swab and a urine sample for ESBL and MBL producers, and inguinal and oropharyngeal (not just nasal) swabs for MRSA [7].

Table 2: Conditional Logistic Regression - all risk factors circumstances analysed

Term	Odds Ratio	95%C.I.	Coefficient	Z-Stat	P value
LTCF	4.0089	1.6935 – 9.4903	1.3885	3.1580	0.0016
DIAL	3.7368	1.1651 – 11.9852	1.3182	2.2169	0.0266
HOSP	1.4976	0.7478 – 2.9990	0.4038	1.1398	0.2544
WARD	2.1905	0.8830 – 5.4340	0.7841	1.6916	0.0907

Linear Regression

Variable	Coefficient	Std Error	F-test	P value
Type Source (Community/Nursing facility)	- 0.310	0.066	22.3077	0.000003
Type Source (Cr. Hemodialys/Nursing facil)	- 0.039	0.106	0.1365	0.711932
Type Source (Hospital / Nursing facility)	- 0.224	0.055	16.5962	0.000055
Type Source (Ward / Nursing facility)	- 0.193	0.073	7.0135	0.008173
CONSTANT	0.439	0.047	88.1235	0.000000
Type Source				

Varsta medie / Any bug

(-) 64.9 (15.21) yrs vs (+) 67.1 (16.9) yrs ; T-stat : 1.3514 ; p : 0.1772

Gender

AnyBug (M) 25.2 % vs AnyBug (F) 25.0 % RR: 1.0058 (0.79 – 1.27)); p: 0.9520 (2 tail)

Term	Odds Ratio	95%	C.I.	Coefficient	S. E.	Z-Statistic	P-Value
CaminBat	2,9624	1,3880	6,3229	1,0860	0,3868	2,8075	0,0050
Dializat	3,5385	1,1123	11,2561	1,2637	0,5904	2,1403	0,0323
Hospital	1,4088	0,6928	2,8647	0,3428	0,3621	0,9466	0,3439
Ward	2,1231	0,8736	5,1596	0,7529	0,4531	1,6617	0,0966
CONSTANT	*	*	*	-1,2637	0,3140	-4,0243	0,0001

Convergence:	Converged
Iterations:	4
Final -2*Log-Likelihood:	426,6426
Cases included:	345

Test	Statistic	D.F.	P-Value
Score	12,6278	4	0,0132
Likelihood Ratio	12,5521	4	0,0137

Conditional Logistic Regression

Term	Odds Ratio	95%	C.I.	Coefficient	S. E.	Z-Statistic	P-Value
CaminBat	2,6882	1,4311	5,0496	0,9889	0,3217	3,0743	0,0021
Dializat	2,5131	0,9198	6,8666	0,9215	0,5128	1,7969	0,0724

Convergence:	Converged
Iterations:	4
Final -2*Log-Likelihood:	240,8501
Cases included:	345

Test	Statistic	D.F.	P-Value
Score	11,8050	2	0,0027
Likelihood Ratio	11,8307	2	0,0027

LTCF clients as an important source of MDRO found through AMS between Covid 19 patients in 2020

The frequently older, sicker residents cared for in LTCFs, have a variety of risk factors for colonization and infection by multidrug-resistant organisms (MDROs). Pathogen cross-transmission within LTCFs is a significant issue and residents of these facilities are frequently moved between the acute and the long-term care settings [2]. For these reasons, LTCFs are an important reservoir for MDROs, such as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE), *Pseudomonas aeruginosa* or *Acinetobacter baumannii* with MDR phenotypes (expressing resistance to ≥ 3 classes of antibiotics) and *Enterobacterales* producing extended-spectrum β -lactamases (ESBLs), high-level cephalosporinases (AmpCs) and/or carbapenemases [3,4]; these MDROs have been included in the present surveillance recommendations.

References

1. CLSI (2014) Analysis and presentation of cumulative antimicrobial susceptibility test data; approved guideline - fourth edition. CLSI document M39-A4. Wayne: Clinical and Laboratory Standards Institute.
2. Cornaglia G, Hryniewicz W, Jarlier V, Kahlmeter G, Mittermayer H, et al. (2004) European recommendations for antimicrobial resistance surveillance. Clin Microbiol Infect 10:349-383.
3. CDC: Dean AG, Arner TG, Sunki GG, et al. Epi Info™, a database and statistics program for public health professionals. CDC, Atlanta, GA, USA, 2011.
4. Smith PW, Bennett G, Bradley S, Drinka P, Lautenbach E, et al. (2008) SHEA/APIC guideline: infection prevention and control in the long-term care facility. Infect Control Hosp Epidemiol 29:785-814.
5. Aschbacher R, Pagani E, Confalonieri M, Farina C, Fazii P, et al. (2016) Review on colonization of residents and staff in Italian long-term care facilities by multidrug-resistant bacteria compared with other European countries. Antimicrob Resist Infect Control 5:33.
6. Aschbacher R, Pagani L, Migliavacca R (2020) Recommendations for the surveillance of multidrug-resistant bacteria in Italian long-term care facilities by the GLISTer working group of the Italian Association of Clinical Microbiologists (AMCLI). Antimicrob Resist Infect Control. <https://doi.org/10.1186/s13756-020-00771-0>.
7. Marchaim D, Chopra T, Bogan C (2012) The burden of multidrug-resistant organisms on tertiary hospitals posed by patients with recent stays in long-term acute care facilities American Journal of Infection Control 40: 760-765.