Case-fatality and risk factors for death in adult patients with nosocomial infection caused by multi-drug resistant organisms, Hungary, 2007-2009

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Background

- Nosocomial infections (NIs) due to multidrug-resistant organisms (MDROs) are associated with longer hospital stay, worse outcome and costly therapies.

- In Hungary, patients with NI caused by certain MDROs are notified to the National Nosocomial Surveillance System (NNSS).

- We aimed to determine risk factors for death in patients infected with a MDRO.

Methods

- We conducted a retrospective cohort study including all adult patients with NI caused by a MDRO notified to NNSS in 2007-09.

- We calculated case-fatality ratios (CFRs) within seven and 30 days of microbiological confirmation, stratified by pathogen and site of infection.

- We computed hazard ratios (HRs) with 95% confidence intervals (CIs) for risk of death using Cox's models.

Results

- 2,437 patients (59% males, median age 67 yrs) were included.

- Median length of stay at hospital was 28 days.

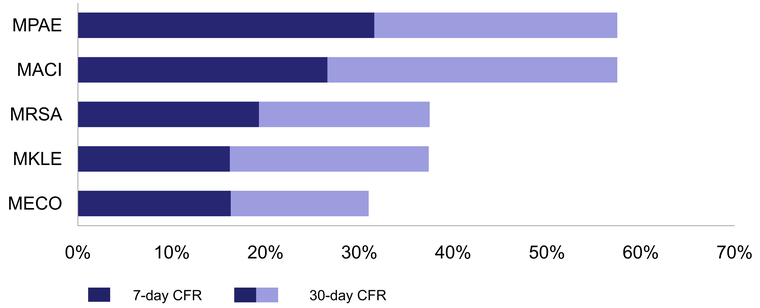
- Distribution of MDROs among the patients: 55% MRSA, 14% MKLE, 10% MACI, 10% MECO, 7% MPAE, 2% MENB, 1% VRE, <1% MSTM, <1% VISA.*

- Wound (28%), bloodstream (16%) and urinary tract (13%) were the most frequent sites of infection. Seventeen percent of patients had infections at multiple sites.

- Seven-day CFR was highest for patients infected with MPAE or MACI (fig. 1) and for those suffering from respiratory or bloodstream infections (fig. 2).

- Risk of death following a MDRO infection was higher in patients with malnutrition and underlying chronic conditions and in those with indwelling medical devices (tab. 1).

Figure 1. Seven- and 30-day case-fatality ratios (CFRs) of patients infected with a MDRO by selected organisms. Hungary, 2007-2009.



* **MPAE** Multidrug-resistant Pseudomonas aeruginosa; **MACI** Multidrug-resistant Acinetobacter baumannii; **MRSA** Methicillin-resistant Staphylococcus aureus; **MKLE** Multidrug-resistant Klebsiella spp; **MECO** Multidrug-resistant Escherichia coli, **MENB** Multidrug-resistant Enterobacter spp, **VRE** Multidrug-resistant Enterococcus spp, **MSTM** Multidrug-resistant Stenotrophomonas maltophilia, **VISA** Vancomcin-resistant Staphylococcus aureus

Figure 2. Seven- and 30-day case-fatality ratios (CFRs) of patients infected with a MDRO by selected infection sites. Hungary, 2007-2009.

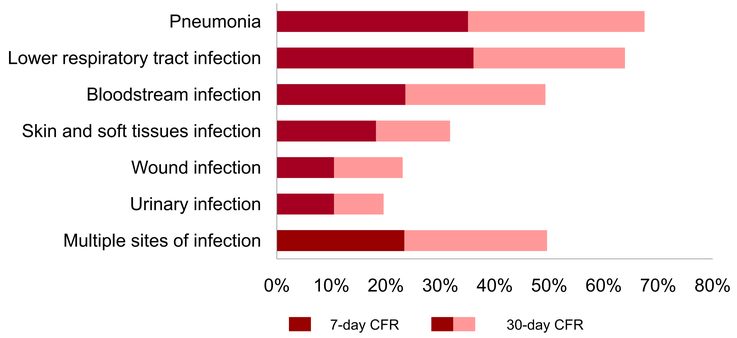


Table 1. Hazard ratios (HRs) for risk of death in 1,907 patients infected with a MDRO. Cox's proportional hazard models stratified by age group and sex. Hungary, 2007-2009.

	HR	95% CI	p-value
Patients characteristics and medical history			
Chronic respiratory diseases	1.20	(1.02, 1.42)	0.030
Cardiovascular diseases	1.27	(1.10, 1.47)	0.001
Malnutrition	1.94	(1.35, 2.79)	<0.001
Hospital stay and therapies			
Treatment in an intensive care unit	1.27	(1.06, 1.53)	0.009
Antibiotic treatment	1.17	(1.01, 1.36)	0.038
Patient transferred to an infectious disease department	0.56	(0.36, 0.85)	0.007
Indwelling medical devices			
Central venous catheter	1.43	(1.20, 1.71)	<0.001
Endotracheal tube	1.47	(1.25, 1.74)	<0.001

Conclusions

- Our results may help health professionals to identify patients at increased risk of death after infection with a MDRO.

- Patients with pre-existing chronic conditions and those who need indwelling medical devices should undergo frequent microbiological test, in order to promptly diagnose a MDRO infection and start appropriate therapy.

- As soon as a MDRO infection is diagnosed, an infectious disease (ID) specialist should be consulted to tailor interventions and patient care, and a transfer to an ID department should be taken into consideration.