



Country-Specific Preventive Medical Information – latest News

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NATO MILMED COE Munich**
in cooperation with Bundeswehr
Medical
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Section 2.2

UKRAINE (UKR)

Antibiotic resistance in Ukraine and bordering regions

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1. Situation:

Increasingly, antibiotic resistance is playing a significant role in the treatment of patients worldwide. In EASTERN EUROPE, antibiotic resistance is a particular burden due to the still inadequate medical infrastructure in some areas. The aim of this document is to draw the attention of **medical professionals in the field, as well as in central medical facilities and in the command authorities**, to the specifics of the antibiotic resistance situation of residents of the UKR, as well as regions close to the border, and to outline a **preliminary empirical therapy recommendation**. In particular, in view of the refugee movements that have already taken place and are foreseeably increasing further, but also in the treatment of wounded UKR forces, attention must be paid to **anticipatory stockpiling of antibiotic substances** and the **consistent application of classic basic hygiene measures**.

CAVE: The statements made here are an **expert opinion based on moderate data reliability** and relate **primarily to inpatients**. Regardless of this, the principles of **antibiotic stewardship (ABS)** and **medical hygiene** continue to apply (see ref. 1).

Antibiotic resistance status of UKR patients from inpatient healthcare facilities (2020 data):

- *Escherichia coli*:
 - Cefotaxime resistance (applies to all third-generation cephalosporines): 53%
 - Ciprofloxacin resistance: 42%
 - Carbapenem resistance: 5%
- *Klebsiella pneumoniae*:
 - Cefotaxime resistance (applies to all third-generation cephalosporines): 85%
 - Ciprofloxacin resistance: 79%
 - Carbapenem resistance: 54%
- *Acinetobacter* spp.:
 - Carbapenem resistance: 77%
- *Pseudomonas aeruginosa*:
 - Carbapenem resistance: 70%
 - Other beta-lactam-based antibiotics: 50-60%
- *Staphylococcus aureus* (MRSA): 18-38%

Further information on pathogens and substance classes is given in ref. 2, p. 121.

2. Assessment

unknown	low	moderate	significant	high
			x	

- Due to the ongoing and increasing intensity of combat operations in UKR, an **increased influx of sick or wounded civilians as well as UKR forces** from inpatient facilities in the crisis area is to be expected.
- The significantly increased antibiotic resistance situation in UKR, as well as in regions close to the border, compared to WESTERN EUROPE, raises the fear of **significantly higher morbidity and mortality** of the above-described group of persons, especially in the presence of traumatic injuries.
- Adequate microbiological diagnostics are currently not feasible on site. On the basis of the current antibiotic resistance situation, the following **recommendations for initial empirical antibiotic therapy** are therefore made. The recommendations made here should be continuously updated and expanded **in collaboration with the relevant national and international advisory and working groups**.
- The following **personal protective equipment (PPE) is required** for direct patient contact: protective gown, disposable gloves, mouth-nose protection or, in the current pandemic context, better FFP2 mask, and, if necessary, additional headgear and protective goggles. However, **classic basic hygiene measures** are and remain of particular importance, and the **observance and consistent implementation of these measures** is here emphasized for preventive medical reasons.
- If the medical care of UKR civilians and UKR forces is planned on a larger scale, then a **medical-diagnostic infrastructure** as well as an **adequate supply of the substances recommended below** should be ensured.
- A national screening (preferably harmonized in Europe) would be appropriate in perspective to generate a **better data basis for further recommendations**.

3. Recommendations

- **The Antibiotic Stewardship (ABS) guidelines are generally applicable**, including re-evaluation of antibiotic therapy after 72 h (see ref. 1).
- **Ambulatory-acquired infections** (primarily affects NATO forces or local population):
 - Therapy according to guidelines of the Paul Ehrlich Society (see ref. 3) in case of insufficient data to assess the resistance situation in the outpatient setting
 - Exception due to the high resistance rate of fluoroquinolones in UKR (*Escherichia coli*: 41.9%, *Klebsiella pneumoniae*: 78.9%) also in the outpatient setting:
 - **No fluoroquinolones!**
 - Consider cotrimoxazole 960 mg as an alternative to oral quinolones or cephalosporins in the context of prehospital primary care
- **Infections acquired in the UKR healthcare system** (nosocomial infections):
 - Significantly increased carbapenem resistance rate in *Acinetobacter* spp. (77%) and *Pseudomonas aeruginosa* (70%) and also in *Klebsiella pneumoniae* (54%)
 - MRSA can also be expected (~28%)
 - Antibiotic resistance rates in UKR military hospitals are generally higher than in civilian hospitals
- **Recommendations for empiric* antibiotic therapy in individuals originating from the UKR:**

	Outpatient (role 1) p.o.	Outpatient (role 1) i.v.	Inpatient (role 2), respectively at-risk patient**	Inpatient (role 2: ICU)
Pneumonia	amox-clav + azithromycin	ampi-sulb (ceftriaxone)*** + azithromycin	meropenem + linezolid	linezolid + cefiderocol****
Urinary tract infection	fosfomycin/ pivmecillinam	Ceftriaxone	piperacillin/tazobactam (meropenem)***	piperacillin/tazobactam (meropenem)***/ ceftazidime-avibactam
Soft tissue infection	amox-clav + clindamycin	Ampi-aubl + clindamycin	piperacillin/tazobactam (meropenem)*** + daptomycin/linezolid	daptomycin/linezolid + cefiderocol**** + metronidazole
Intraabdominal infection	amox-clav + metronidazole	ceftriaxone + metronidazole	piperacillin/tazobactam (meropenem)*** + daptomycin/linezolid	ceftazidime-avibactam + daptomycin/linezolid + metronidazole
CNS infection	-	-	-	cefiderocol**** + Linezolid + metronidazol

*If necessary, changeover or de-escalation after results of microbiological diagnostics and resistance testing are available

**At-risk patient = patient with treatment at a UKR inpatient healthcare facility within the last four months

***Substitute in case of penicillin allergy

****Cefiderocol if meropenem resistance is expected to be high, but consider evidence of slight inferiority to *Acinetobacter* spp. over standard therapy (consider alternative meropenem/colistin if *Acinetobacter* spp. infections are suspected)

References:

1. <https://www.antibiotic-stewardship.de/>
2. <https://www.ecdc.europa.eu/sites/default/files/documents/ECDC-WHO-AMR-report.pdf>
3. <https://www.p-e-g.org/files/content/Service/Empfehlungen-Leitlinien/PEG-S2k-Leitlinie-Update-2018.pdf>

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