IDWeek

Epidemiological Evaluation of Antibiotic Resistance and Subsequent Effect on Healthcare Resource Utilization among Subjects with *Pseudomonas aeruginosa* Infections in Italy

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Background

- The susceptibility rates for antimicrobial agents for Gram negatives pathogens (GNP) vary across Europe, and Italy shows one of the highest multidrug resistant (MDR)/ extensively Drug Resistant (XDR) GNP rates among the Western European countries.
- To the best of our knowledge, there is a lack of data specifically addressing the epidemiology of MDR/XDR *P.aeruginosa* (PA) strains isolated from patients with nosocomial pneumonia infections (NP), complicated urinary tract infections (cUTIs) and complicated intra-abdominal infections (cIAIs) admitted to Italian hospitals.
- This study aims to evaluate the rate of MDR/XDR PA infections as well as health care resources utilization (intensive care unit stays, prolonged hospital stay) in NP, cUTI, cIAI caused by PA.

Material and Methods

- **Setting:** Multicenter prospective study conducted in 8 large teaching hospitals in Italy **(Figure 1).**
- **Study period:** June 2018-February 2020.
- **Design:** Prospective observational analysis from hospital medical chart reviews
- During the study period the investigators conducted a daily evaluation of microbiological results obtained from respiratory, urinary and intra-abdominal samples.
- **Inclusion criteria:** Patients aged over 18 years with a clinical diagnosis of NP, cUTI or cIAI due to PA.
- **Definition:** *MDR PA:* non-susceptibility to at least one agent in three or more antimicrobial categories. *XDR PA:* non-susceptibility to at least one agent in all but two or fewer antimicrobial categories.
- The impact of PA infections on the health care resources utilization metrics included *i)* hospital length of stay (LOS) and *ii)* intensive care unit (ICU) LOS.

Figure 1

Results

CLINICAL CHARACTERISTICS OF PATIENTS WITH PSEUDO-MONAS AERUGINOSA INFECTIONS

- Overall, a total of **95 patients** with a definite microbiological diagnosis of nosocomial infection due to PA were enrolled and followed prospectively.
- Clinical and epidemiological information of the study population is shown in **Table 1**.
- Overall, **51/95 patients (53.7%)** had **nosocomial pneumonia, 33/95 (34.7%)** cUTIs and **11/95 (11.5%)** cIAIs.
- Almost **one-third of patients (28.4%)** reported either **MDR or XDR *P.aeruginosa*** infection **(Figure 2)**.
- Clinical characteristics of patients with MDR/XDR *P.aeruginosa* infections are reported in **Table 1**.
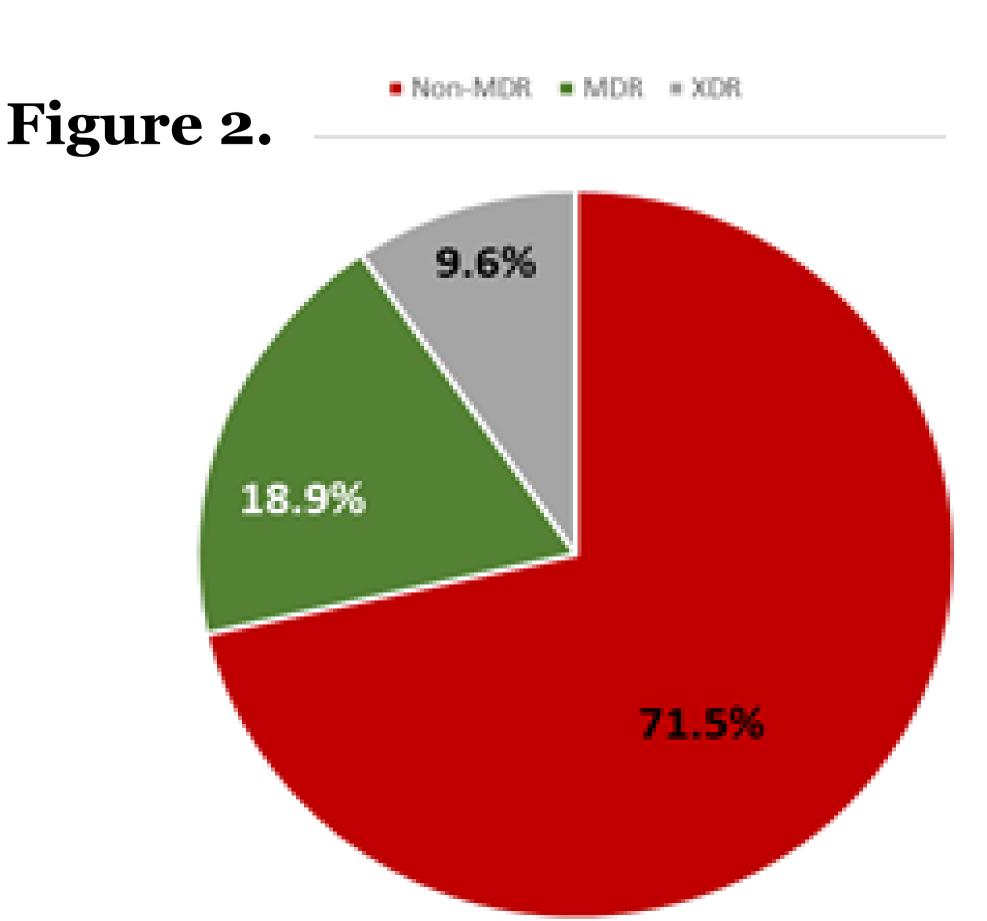
Figure 2.

Legend: Non-MDR, MDR, XDR
9.6%, 18.9%, 71.5%

Table 1. Demographics and Clinical Characteristics of the 95 patients with nosocomial infections due to PA

Characteristics	N=95	MDR/XDR (n=27)
Age, mean (SD)	65.4 (15.2)	66.7 (14.9)
Male sex, n (%)	56 (58.9)	18 (66.7)
Underlying medical conditions, n (%)		
Diabetes mellitus	27 (28.4)	6 (22.2)
Chronic renal failure/hemodialysis	22 (23.2)	4 (14.8)
Heart disease	19 (20.0)	6 (22.2)
Solid tumors	17 (17.9)	4 (14.8)
Liver disease	9 (9.5)	3 (11.1)
Type of nosocomial infection, n(%)		
Nosocomial pneumonia	51 (53.7)	15 (55.6)
Complicated Urinary tract infection	33 (34.7)	7 (25.9)
Complicated Intra-abdominal infection	11 (11.6)	5 (18.5)
Predisposing conditions*, n (%)		
Invasive device	65 (68.4)	18 (66.7)
Previous hospitalization (up to 6 months)	58/92 (63.0)	19 (70.4)
Surgeries and major invasive procedures	38/93 (40.9)	12 (44.4)
Previous MDR colonization	20/80 (25.0)	7 (25.9)
Total parenteral nutrition	14/92 (15.2)	7 (25.9)

* A few patients had missing values

HEALTHCARE RESOURCE UTILIZATION

- Health care resource utilization, stratified by patients with and without MDR/XDR nosocomial infections, is reported in **Table 2**.
- Overall, in our study population, median hospital LOS and ICU LOS were 42.0 (IQR=39.0) and 15.5 (IQR=37.0) days, respectively.
- There was a statistically significant longer median hospital LOS for patients with MDR/XDR infections compared to non MDR/XDR PA infections (53.0 vs. 36.5 days, p=0.04).
- ICU LOS also trended towards being longer for patients with MDR/XDR infections compared to those with non-MDR/XDR infections (25.5 vs. 13.5 days). However, such difference was not statistically significant.

Table 2. Health care resource utilization by presence of MDR/XDR, in strata of type of infection

Variables	MDR/XDR (n=27)	No MDR/XDR (n=68)	P-value
Overall study population (n=95)			
Hospital LOS, median (IQR)	53.0 (47.0)	36.5 (35.5)	**0.04**
ICU LOS, median (IQR)	25.5 (41.5)	13.5 (37.0)	0.10
Patients with NP (n=51)			
Hospital LOS, median (IQR)	33.0 (38.0)	25.5 (37.0)	0.59
ICU LOS, median (IQR)	42.0 (53.0)	28.0 (37.0)	0.40
Patients with cUTI (n=33)			
Hospital LOS, median (IQR)	65.0 (120.0)	41.0 (30.0)	**0.02**
ICU LOS, median (IQR)	25.5 (17.7)	4.5 (6.5)	0.11
Patients with cIAI (n=11)			
Hospital LOS, median (IQR)	61.0 (10.0)	35.5 (21.0)	0.12
ICU LOS, median (IQR)	12.0 (-)	3.5 (1.0)	0.54

Conclusions
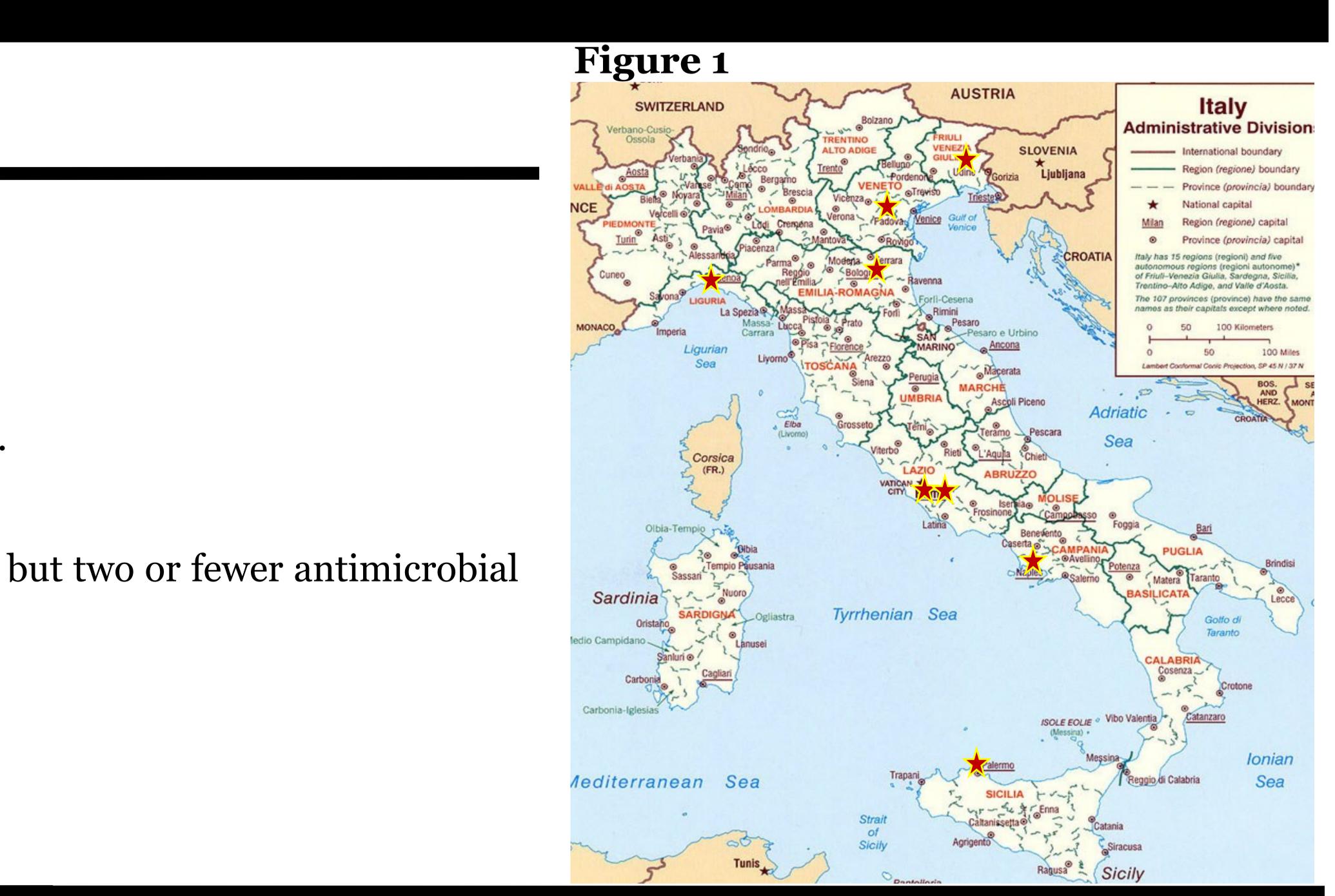
- MDR/XDR isolates were prevalent among Italian patients with nosocomial infections due to *Pseudomonas aeruginosa*
- Overall, the present study suggests a positive correlation between having MDR-XDR *Pseudomonas aeruginosa* nosocomial infections (NP, cUTI, and cIAI) and increased healthcare resource utilization that require further attention from a disease management perspective.