

Clinical Manifestations of *Pseudomonas aeruginosa* Bacteremia: A Single Center Study

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Abstract

Background *Pseudomonas aeruginosa* is an important pathogen causing severe infections in immunocompromised and critically ill children. Multidrug-resistant (MDR) strains are associated with high mortality. This study aimed to evaluate the clinical characteristics of pediatric *Pseudomonas aeruginosa* bacteremia at a single center and to assess antimicrobial susceptibility patterns.

Method This retrospective study included pediatric patients or patients treated in the pediatric ward with *Pseudomonas aeruginosa* bacteremia at Samsung Medical Center between 2010 and 2024. Clinical data were obtained from the Clinical Data Warehouse (CDW). Thirty-day mortality was analyzed according to MDR status, ICU admission, underlying malignancy, and age group (younger than 2 years vs. 2 years and older). The thirty-day survival rate was analyzed using the Kaplan–Meier method, and groups were compared using the log-rank test.

Result A total of 179 episodes of *Pseudomonas aeruginosa* bacteremia were identified in 104 patients. The median age at the first episode was 9 years (IQR, 1-15 years). Based on the first episode (n=104), 15.4% (16/104) were admitted to intensive care units. Among the 104 patients, 69.2% (72/104) had underlying malignancy, and 31.7% (33/104) had undergone transplantation (26 hematopoietic stem cell and 7 solid organ). The 30-day survival rate was 76.2%. Antimicrobial susceptibility rates of the initial 104 isolates were as follows: amikacin 97.9% (92/94), ceftazidime 73.8% (76/103), cefepime 79.2% (80/101), ciprofloxacin 89.1% (90/101), imipenem 77.5% (79/102), meropenem 76.7% (79/103), and piperacillin/tazobactam 73.3% (74/101). Thirty-day survival was significantly lower in the MDR group (45.0% vs. 84.0%) and in patients with ICU admission (50.0% vs. 87.3%), while patients with underlying malignancy showed higher survival (85.9% vs. 55.2%) (all $p<0.001$).

Conclusion Multidrug-resistant *Pseudomonas aeruginosa* was associated with poorer 30-day survival, highlighting the need for continued monitoring of resistance patterns in pediatric bacteremia.

Background

- *Pseudomonas aeruginosa* bacteremia: associated with poor outcome, esp. in pediatric and immunocompromised patients
- Increasing prevalence of antimicrobial-resistant *P. aeruginosa* (MDR/XDR)
- Purpose: to analyze antimicrobial resistance profiles, and outcomes of *P. aeruginosa* bacteremia



Method

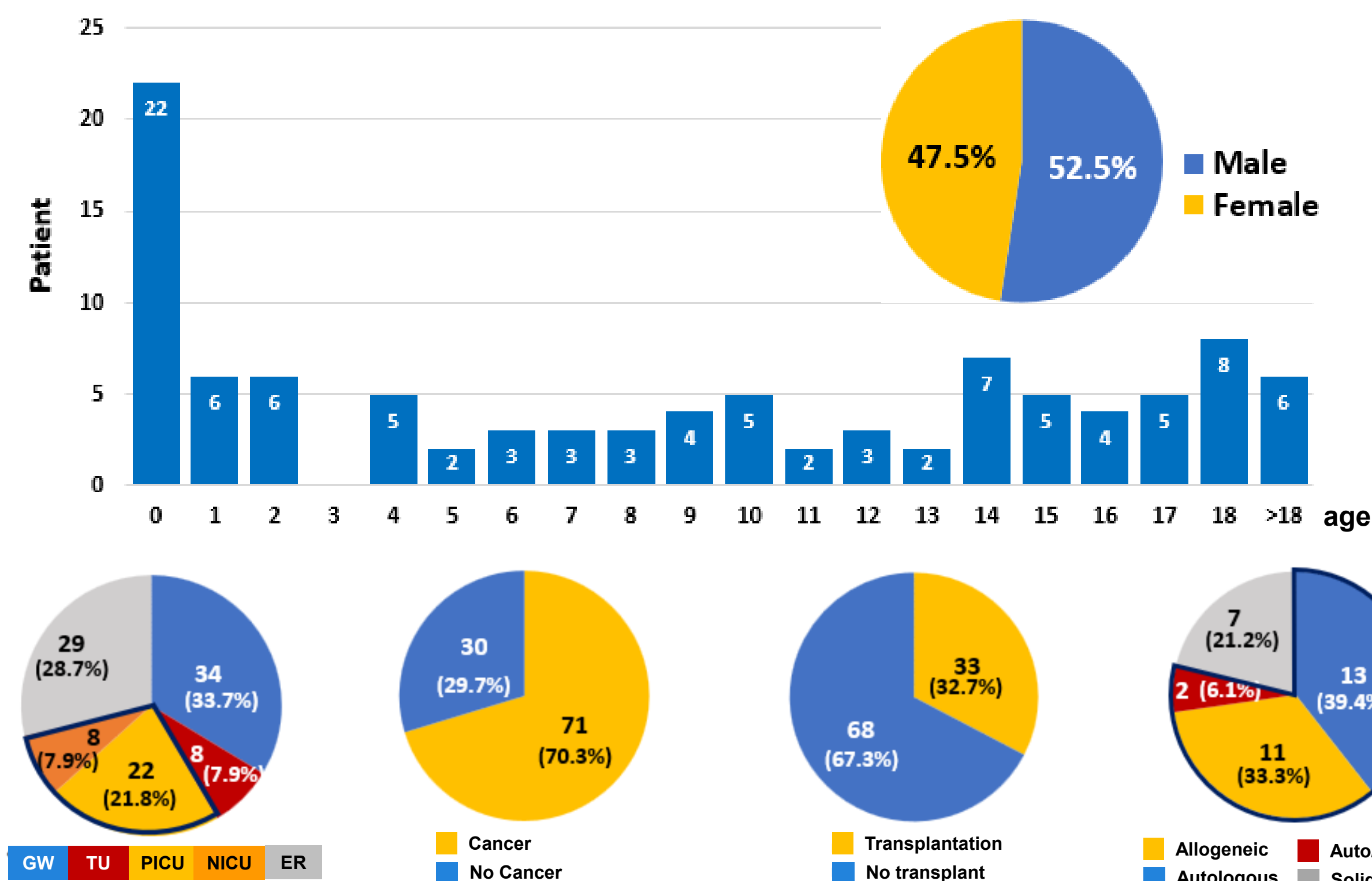
- Single center, retrospective study (Jan 2010 to Dec 2024)
- Objective: Patients with *P. aeruginosa* bacteremia from pediatric wards: General ward (GW), Transplant unit (TU), and Neonatal/Pediatric ICU (NICU/PICU)
- Collected data: age, ward, underlying malignancy, transplant status, culture date, antimicrobial susceptibility, death
- Data source: Clinical Data Warehouse (CDW) of Samsung Medical Center
- Definition of recurrent bacteremia: *P. aeruginosa* detected ≥ 7 days apart
- MDR status: based on the isolate from the last episode
- Survival: from first bacteremia to death or last follow-up

MDR *P. aeruginosa* is defined as *P. aeruginosa* not susceptible to at least 1 antibiotic in **at least 3 antibiotic classes** for which *P. aeruginosa* susceptibility is generally expected: penicillins, cephalosporins, fluoroquinolones, aminoglycosides, and carbapenems.

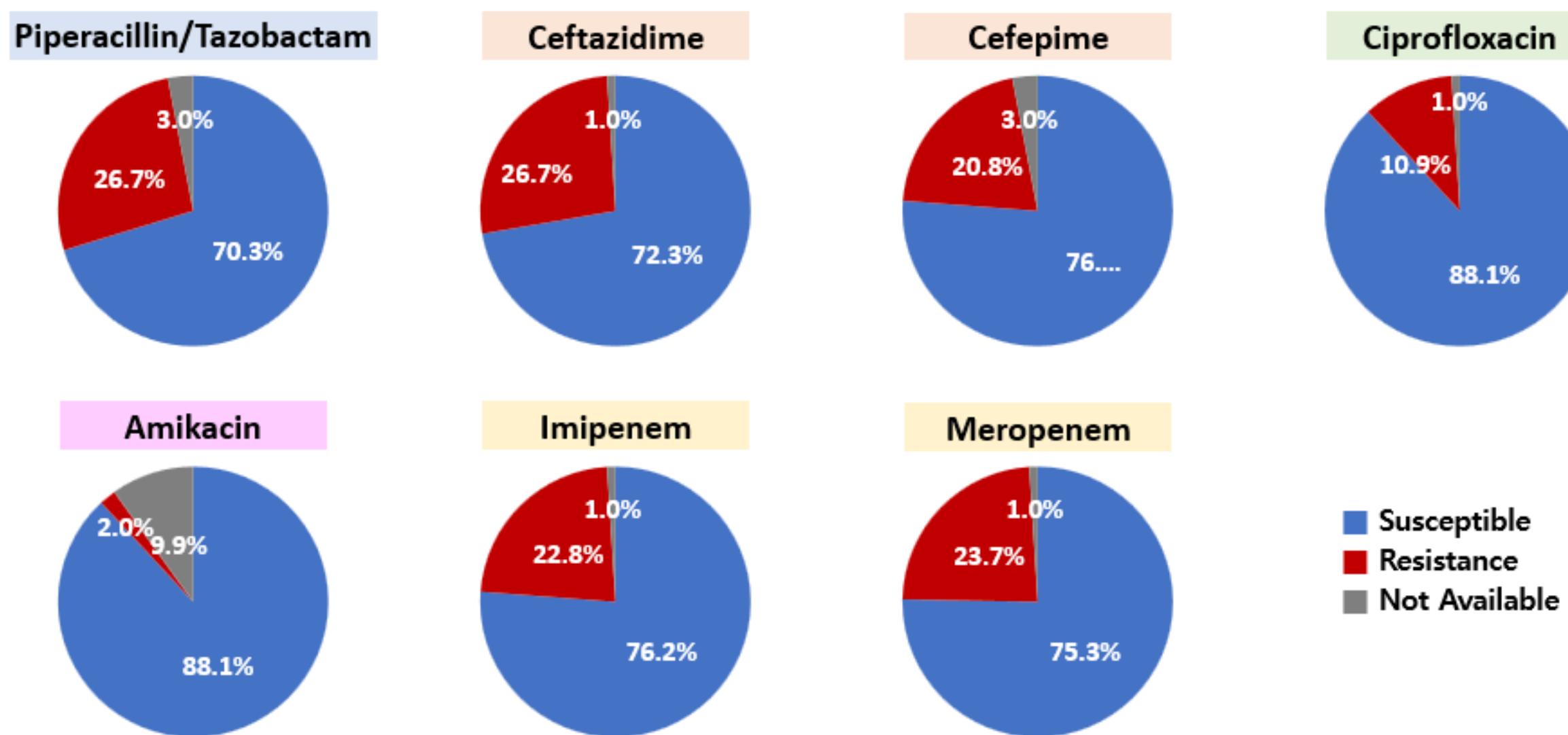
Result

I. Patient characteristics

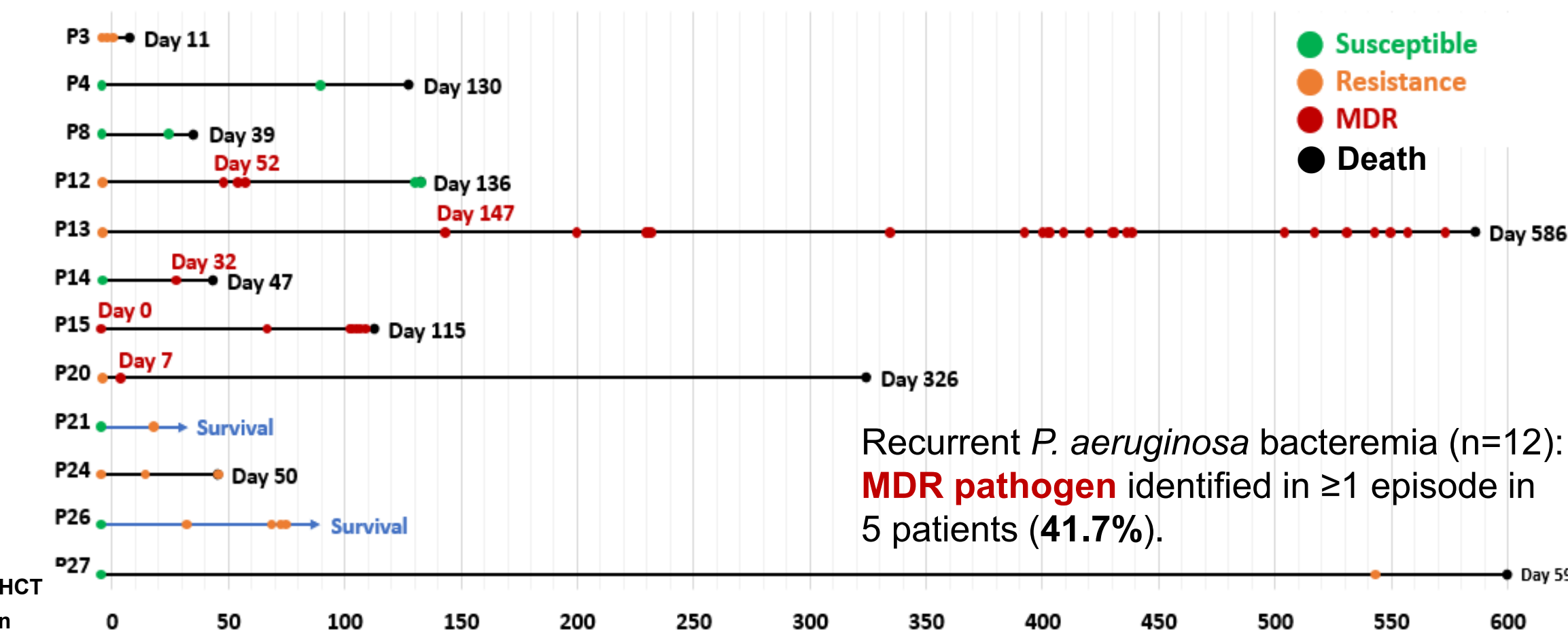
- 101 patients, 175 episodes of *P. aeruginosa* bacteremia
- Male (52.5%), median age: **9 years** (range, 0-22 years)
- General ward (GW) 34%, Pediatric ICU (PICU) 22% Neonatal ICU (NICU) 8%, Transplant unit (TU) 8%, ER 29%
- Malignancy 70%
- Transplant recipient 33% (Autologous HCT 39%, Allogeneic HCT 33%, Autologous/allogeneic HCT 6%, Solid organ transplant 21%)



II. Antibiotics resistance

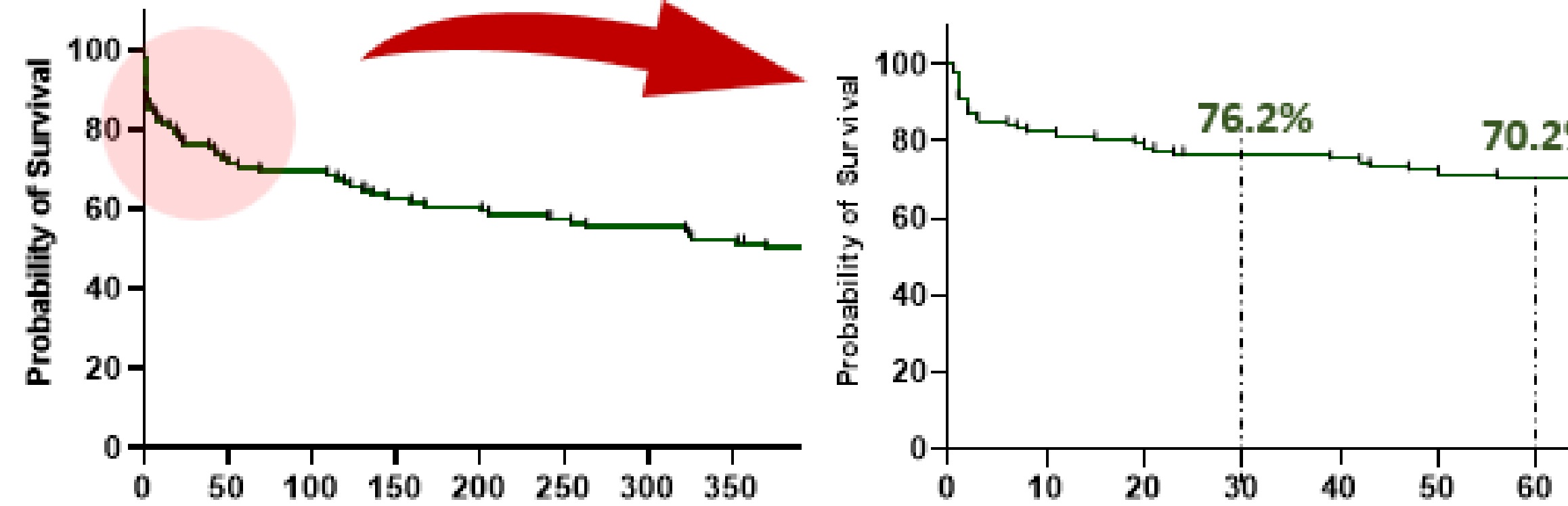


III. Patients with recurrent *P. aeruginosa* bacteremia

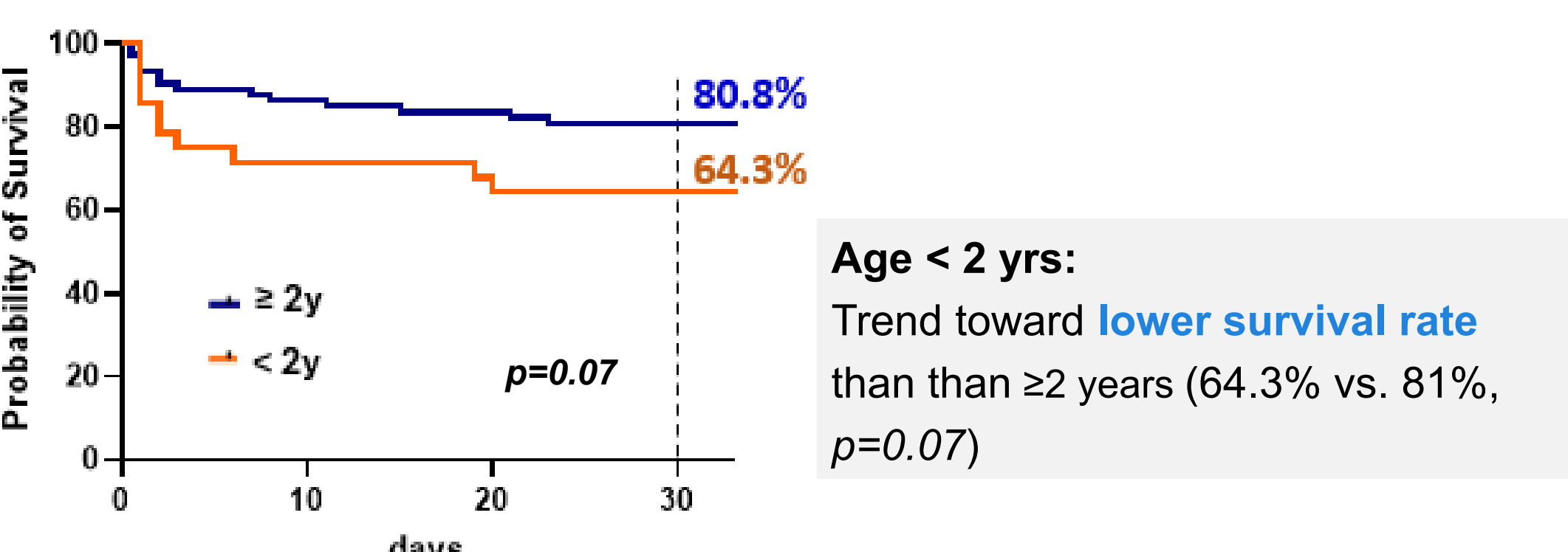


IV. 30-day overall survival and univariable analysis

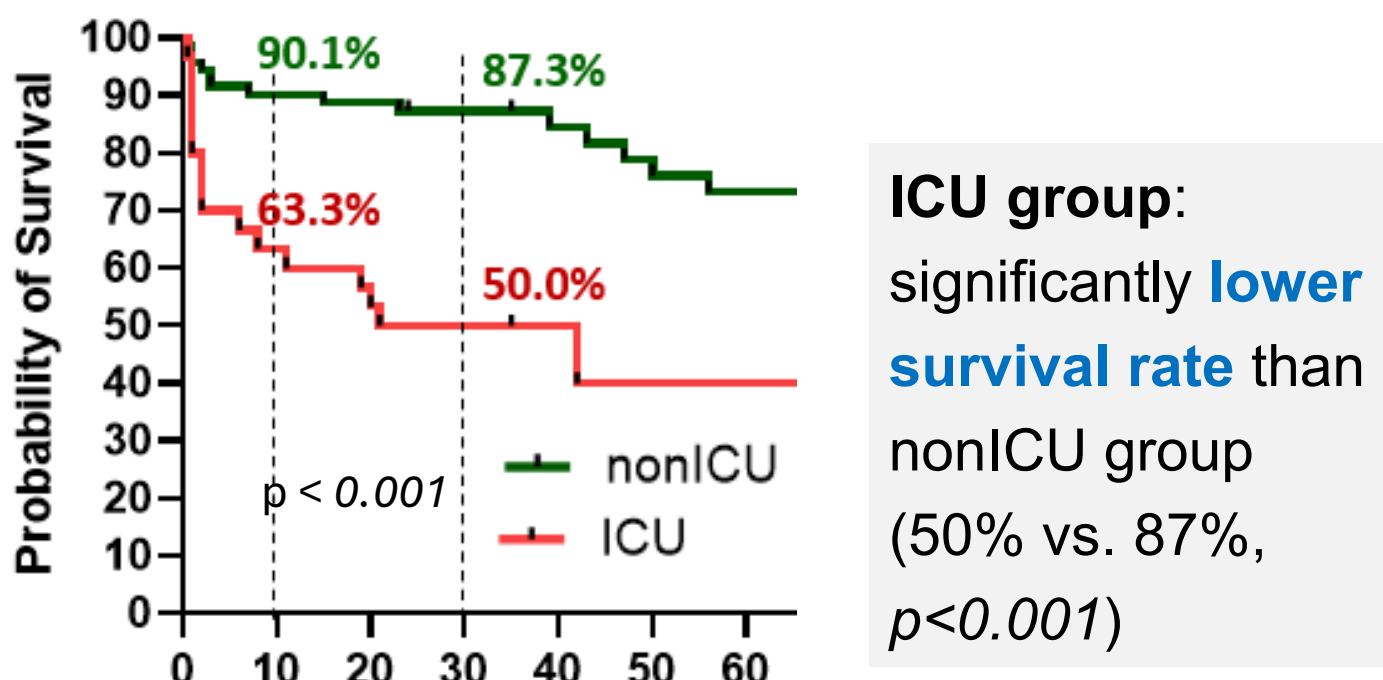
① Overall survival



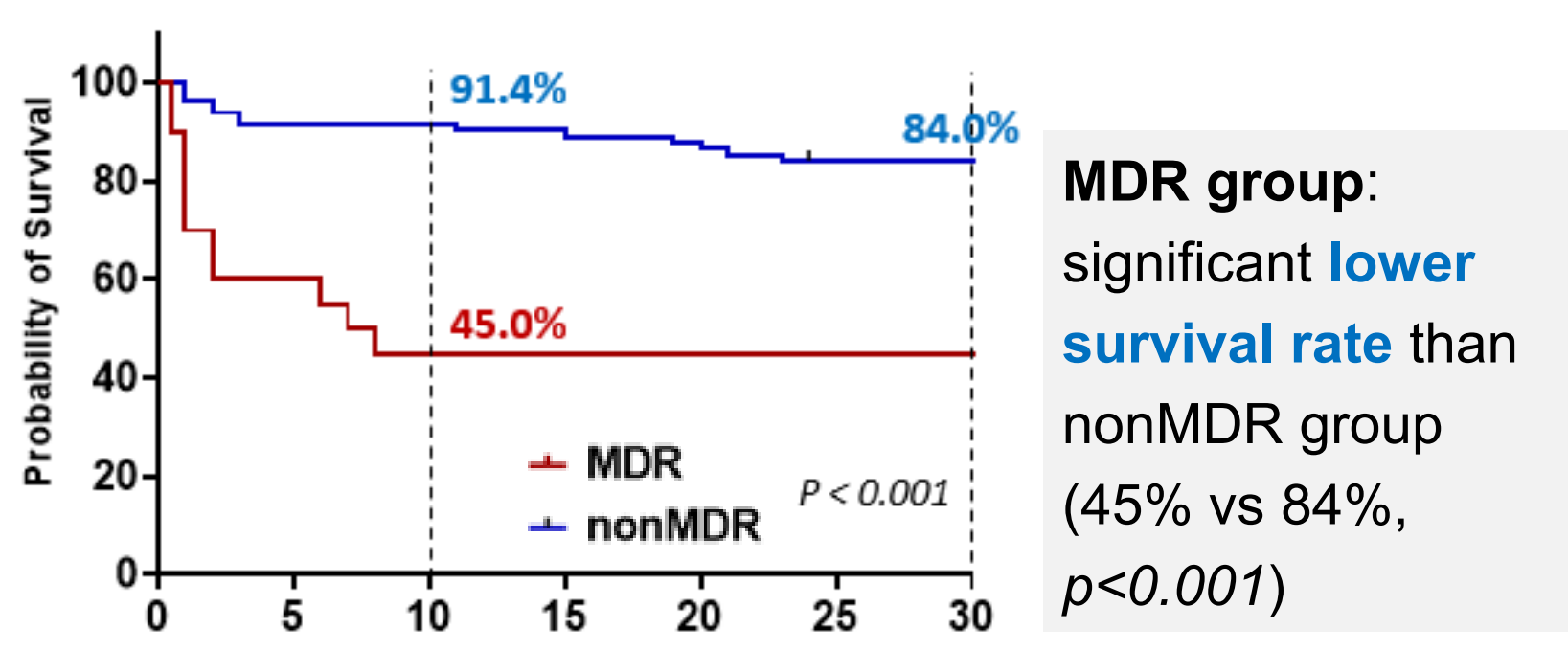
② Age < 2yrs (n=28) vs. ≥ 2yrs (n=73)



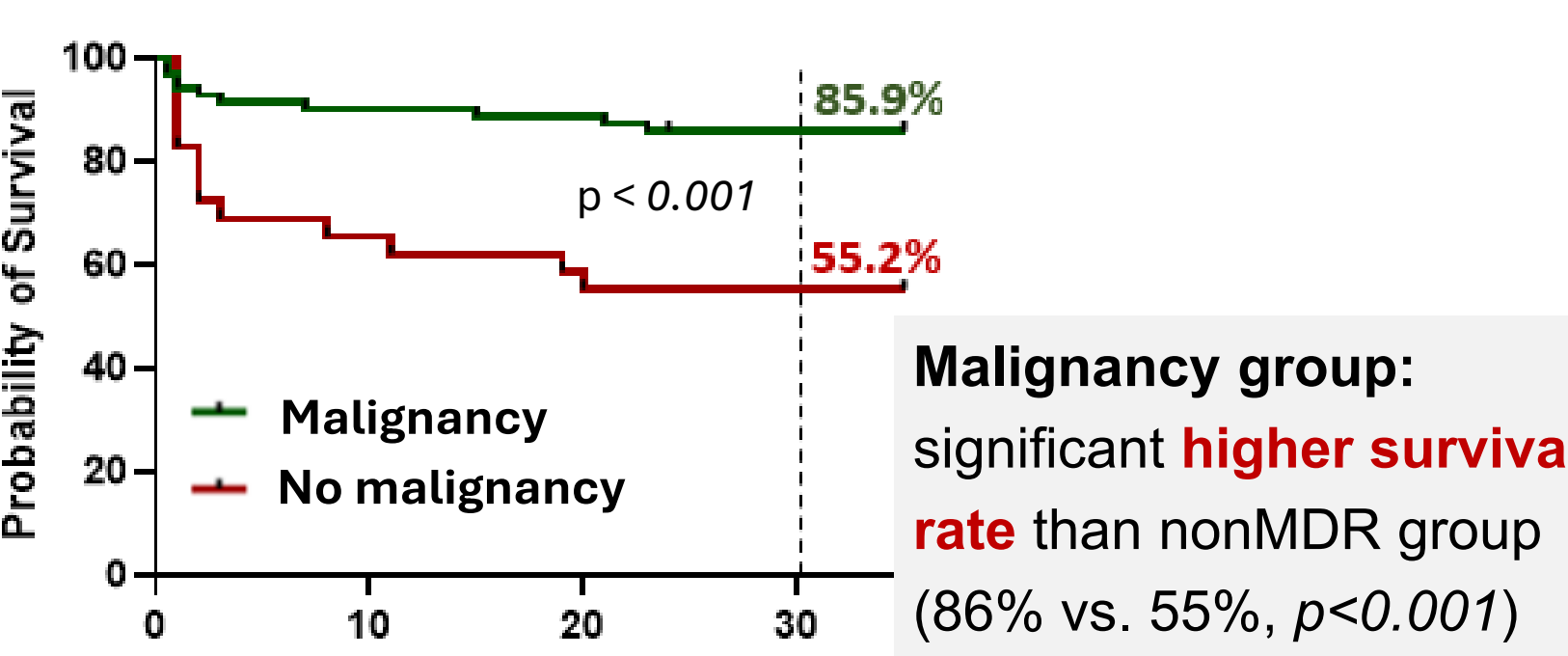
③ ICU (n=30) vs. nonICU (n=71)



④ MDR (n=20) vs. nonMDR (n=80)



⑤ Malignancy (n=71) vs no malignancy (n=30)



Summary and Conclusion

- Among patients with *P. aeruginosa* bacteremia from pediatric wards, the 30-day overall survival rate was 76.2%.
- The MDR group, ICU patients showed significant higher mortality than nonMDR group and nonICU group (all $p<0.001$)
- Patients aged < 2 years showed a trend toward higher mortality (vs. ≥ 2 years, $p=0.07$)
- Patients with malignancy: higher survival rate (may related to initial empirical antibiotic choices – early anti-pseudomonal coverage)
- Further studies are needed in the era of novel anti-pseudomonal antibiotics.