

# Misidentification Rate of *Acinetobacter baumannii* Isolated from Invasive Infections in Children

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## BACKGROUND

- Multidrug-resistant *Acinetobacter baumannii* (AB) infections have increased worldwide, with AB invasive infections known to have a worse clinical outcome than non-*baumannii* *Acinetobacter* infections.
- The spread of extensively drug-resistant AB belonging to the clonal complex (CC) 92 have been reported worldwide suggesting national and global transmissions.
- However, currently, phenotypic identification by semi-automated commercial identification systems struggle to distinguish *Acinetobacter* subspecies; especially the four closely related subspecies of the *Acinetobacter calcoaceticus*-*Acinetobacter baumannii* (ACB) complex; *A. calcoaceticus*, *A. baumannii*, *A. nosocomialis* (genospecies 13TU), and *A. pittii* (genospecies 3).

## OBJECTIVES

- The primary objective of this study was to examine the rate of misidentification of AB isolated from invasive infections in children.
- The secondary objective was to observe the clonal types and relationships of AB strains isolated from these patients.

## MATERIALS AND METHODS

- From January 2001 to December 2017, patients 18 years old and below who were treated for invasive AB infections at Seoul National University Hospital were included.
- All isolates identified as AB by commercial identification systems, cultured from sterile body fluids of the study participants, were prospectively collected and stored at -70°C.

- The stored bacteria were sub-cultured and DNA was isolated.
- Subspecies identification was carried out by PCR amplification and sequencing of the *rpoB* gene.
- For isolates identified as AB through sequencing of the *rpoB* gene, multi-locus sequence typing (MLST) using the Oxford database (<https://pubmlst.org/abaumannii/>) was carried out.
- Clinical data were retrospectively reviewed.

## RESULTS

- During the 17-year study period, 121 AB isolates were obtained from patients treated for invasive infections.
- Duplicate isolates (n=11), isolates that did not subculture for DNA isolation (n=4), and isolates without any clinical data (n=3) were eliminated.
- A total 103 isolates underwent further subspecies identification, which were cultured from the blood (n=87), peritoneal fluid (n=11), pleural fluid (n=2), cerebrospinal fluid (n=2), and bronchoalveolar fluid (n=1).
- The median age of the patients was 2 (IQR 0-7) years old and 47 (45.6%) were male.

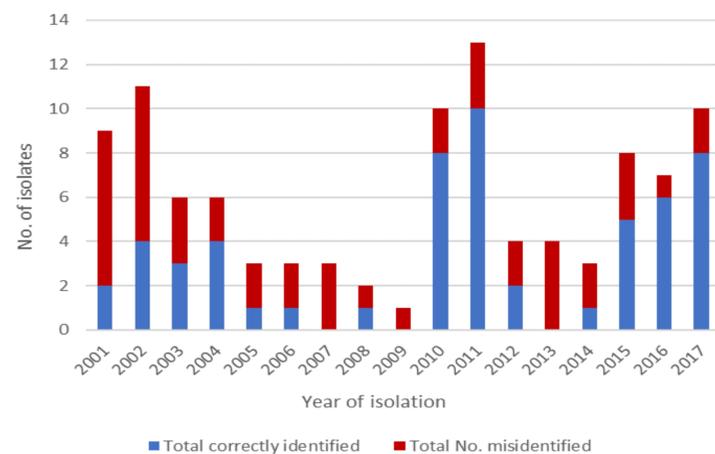


Figure 1. Distribution of *A. baumannii* collected by year of isolation

- Through *rpoB* gene sequencing, 56 (54.4%) of the 103 isolates initially identified as AB by commercial identification systems were found to be correctly identified.

Table 1. Subspecies identification by *rpoB* sequencing

Subspecies		No. of cases (%) (N=103)
ACB complex	<i>A. baumannii</i>	56 (54.4)
	<i>A. nosocomialis</i>	26 (25.2)
	<i>A. pittii</i>	11 (10.7)
	<i>A. calcoaceticus</i>	1 (1.0)
Non-ACB complex	<i>A. seifertii</i>	3 (3.0)
	<i>A. soli</i>	3 (3.0)
	<i>A. bereziniae</i>	1 (1.0)
	<i>A. iwoffii</i>	1 (1.0)
	<i>A. junii</i>	1 (1.0)

- The misidentification rate was 45.6%.
- The most frequently identified non-AB subspecies was *A. nosocomialis* (n=26, 25.2%), followed by *A. pittii* (n=11, 10.7%), both of which belong to the ACB complex.
- Isolates identified as AB underwent MLST.

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Isolated STs	1536	159	17	17	159	17		829		138	75	829		735	395	137	138
		868		1125						138	75				395	138	190
		1125								1125	75				395	395	395
										1201	88			1125	395	395	395
										1656	138				784	395	395
										1656	138					735	735
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Figure 3. Yearly distribution of the sequence types of *A. baumannii*

- eBURST analysis showed the dominant clonal complex as CC92.

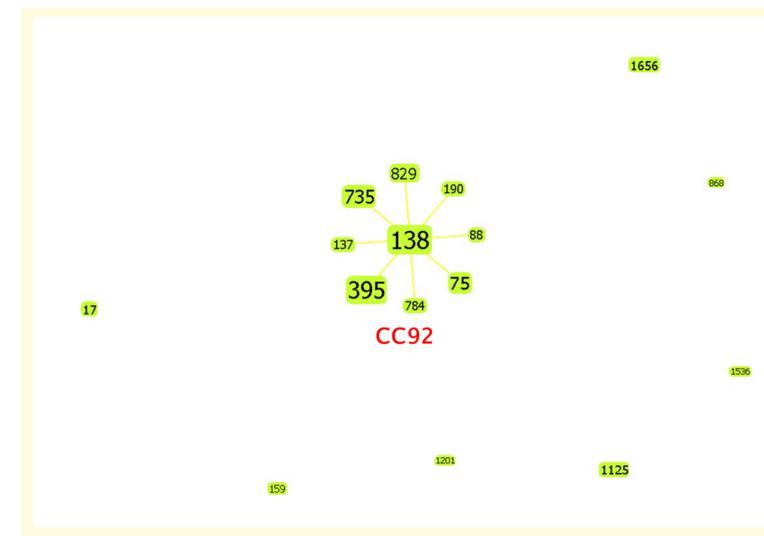


Figure 4. eBURST analysis of the isolates identified as *A. baumannii* through *rpoB* sequencing.

## SUMMARY AND CONCLUSION

- There was a high rate of misidentification of the *Acinetobacter* subspecies causing invasive infections in children.
- CC92 is the dominant strain causing invasive AB infections in children in South Korea after 2010.
- Correct identification and effective measures to prevent the spread of AB are urgent, especially as they are a threat to the most vulnerable patients in healthcare settings.

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