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Presented a poster report at the International ID Week Conference in Boston, Massachusetts. Principal author of a publication in IDSA Oxford Academic.

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Outbreak caused by pathogenic bacteria in the intensive care unit of a large hospital in Almaty city

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65 patients were treated in the ICU of a hospital in Almaty in March – May



PURPOSE OF STUDY



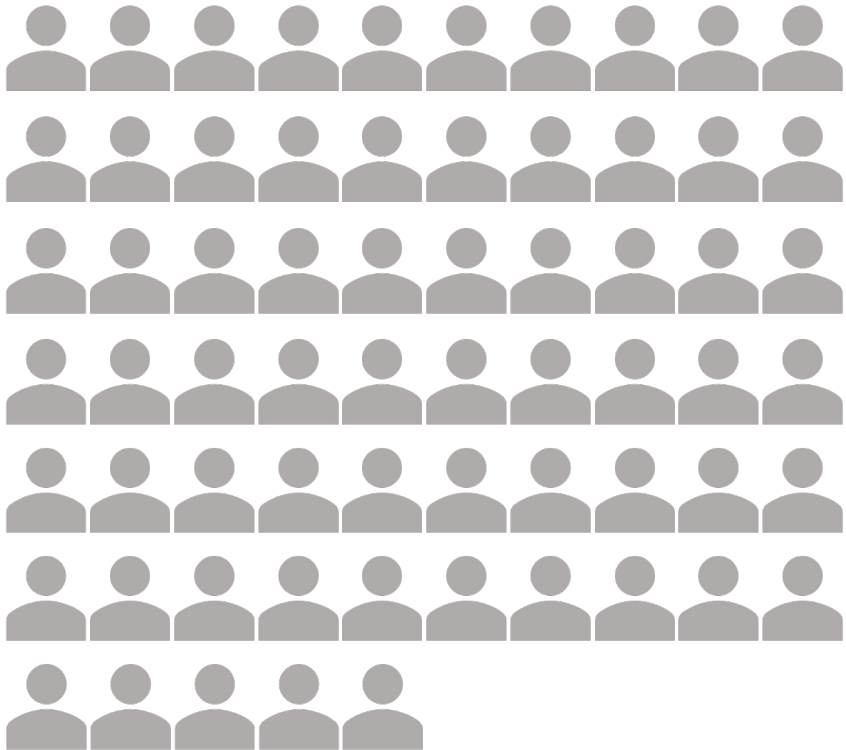
We set the goal of
investigating the outbreak



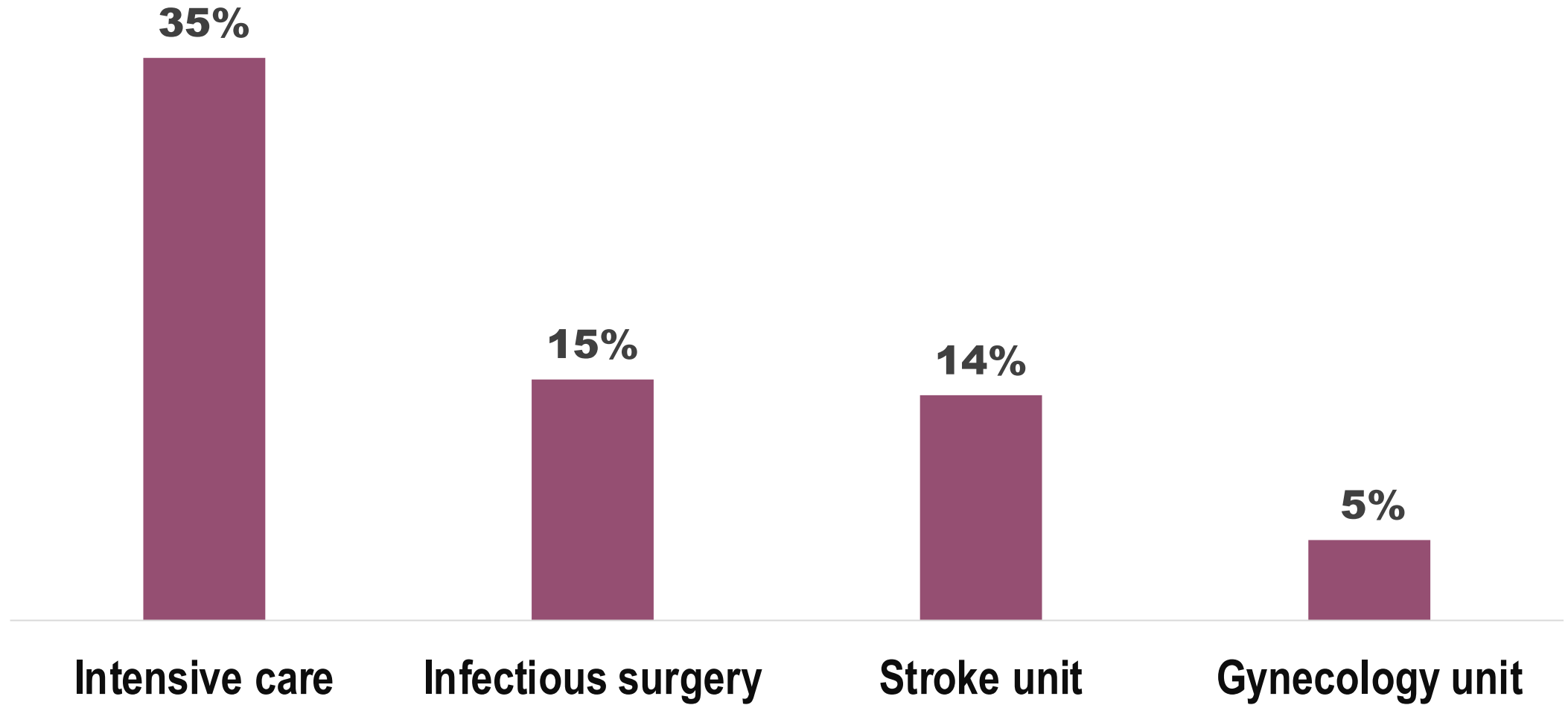
DATA WERE COLLECTED FROM HEALTH RECORDS AND LABORATORY FINDINGS



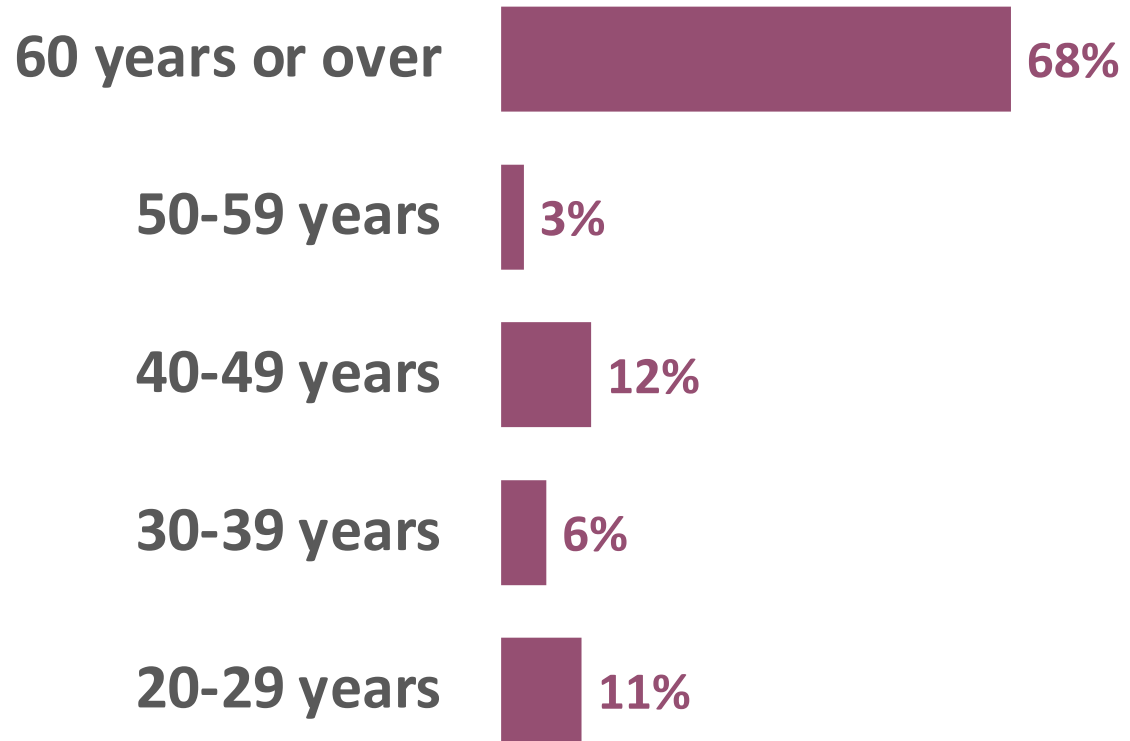
65 RECEIVED HOSPITAL TREATMENT IN ICU



PATIENTS TRANSFERRED FROM OTHER UNITS INTO ICU:

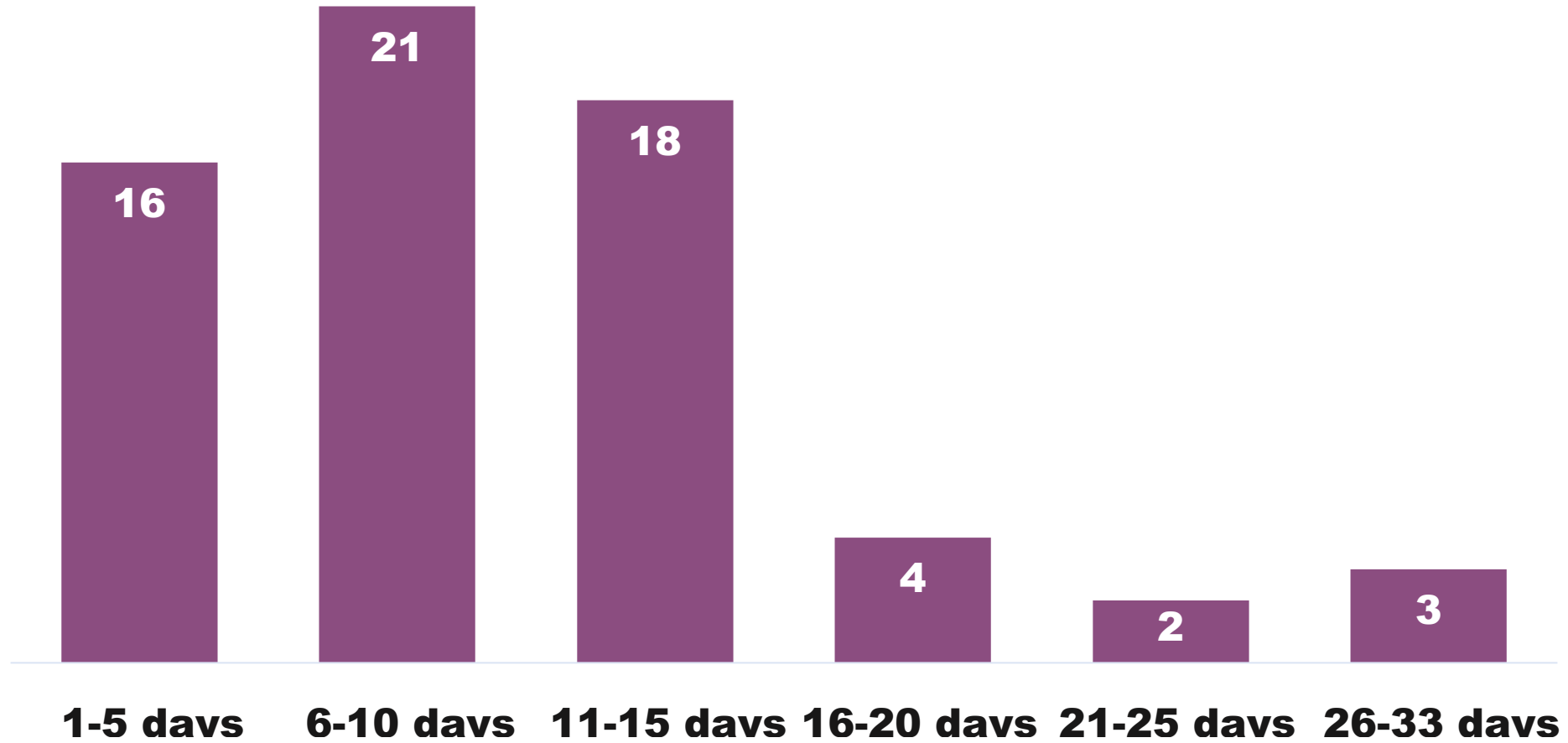


Demographic profile of patients

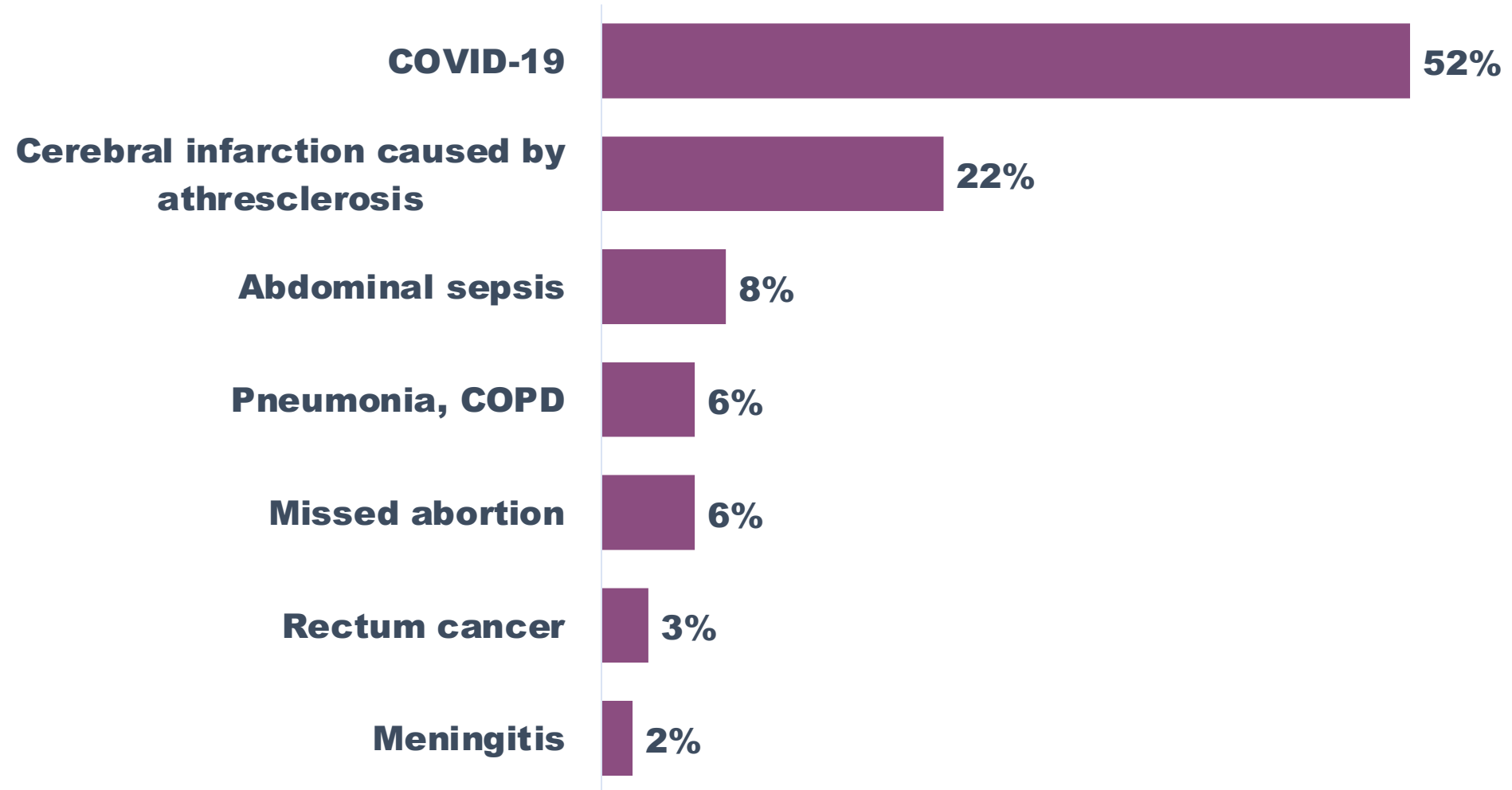


Duration of patient treatment in hospital settings

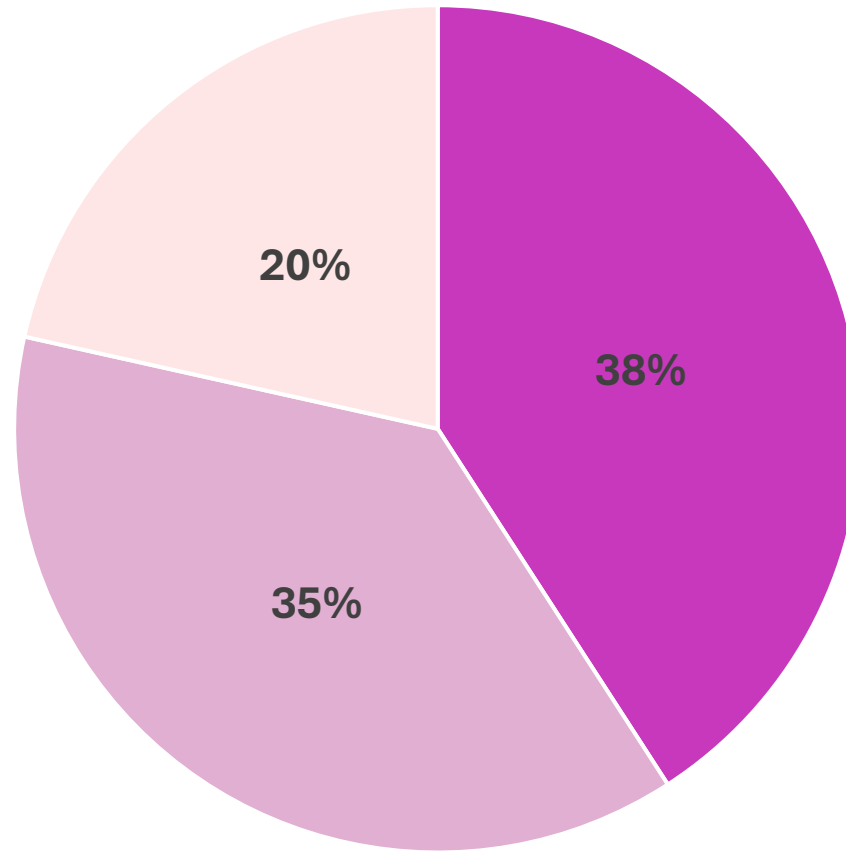
Number of patients



Final diagnoses of patients in the ICU

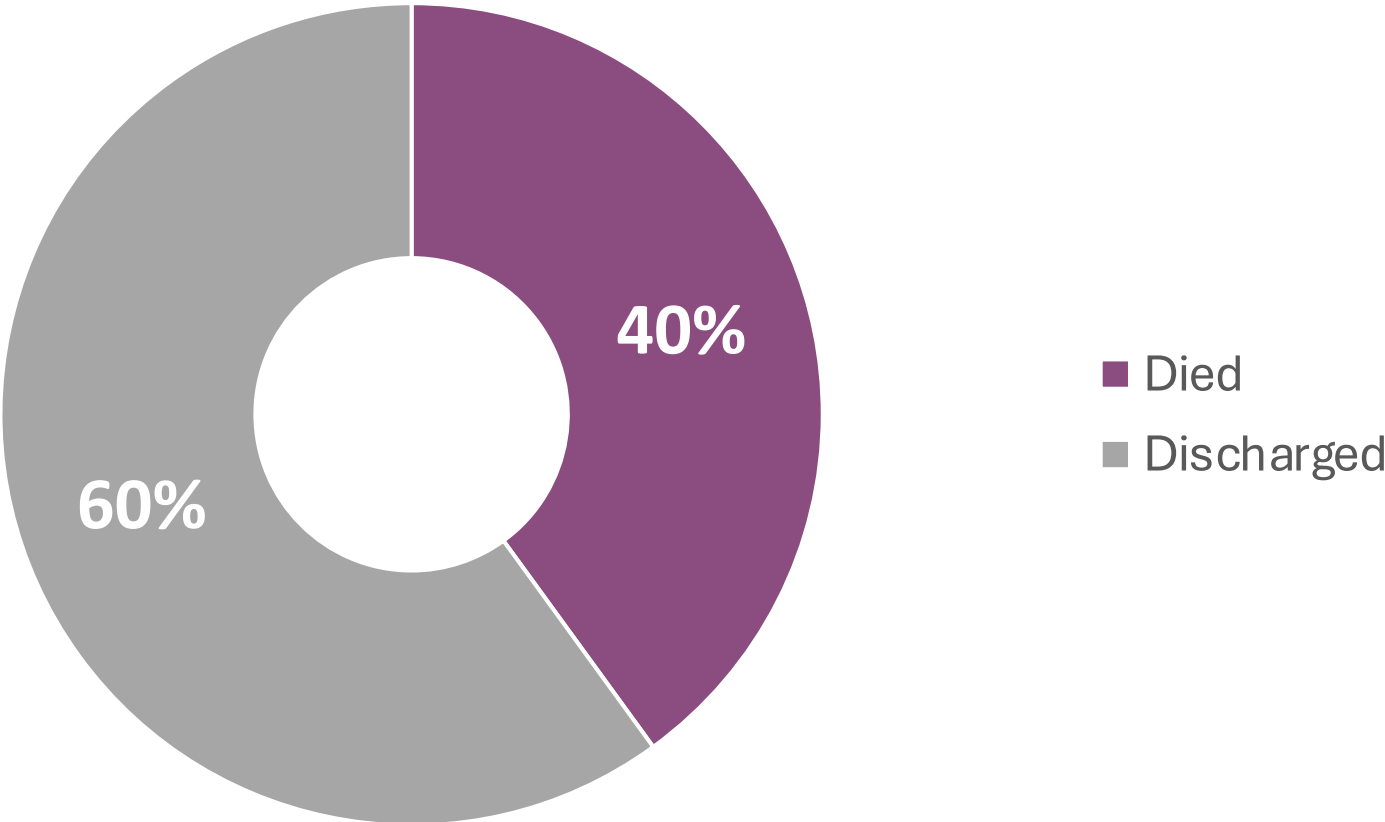


Morbidity and invasive procedures among ICU patients



■ ALV ■ Central venous catheter ■ Urinary catheter

Outcome of patients who received hospital treatment in ICU



N = 26

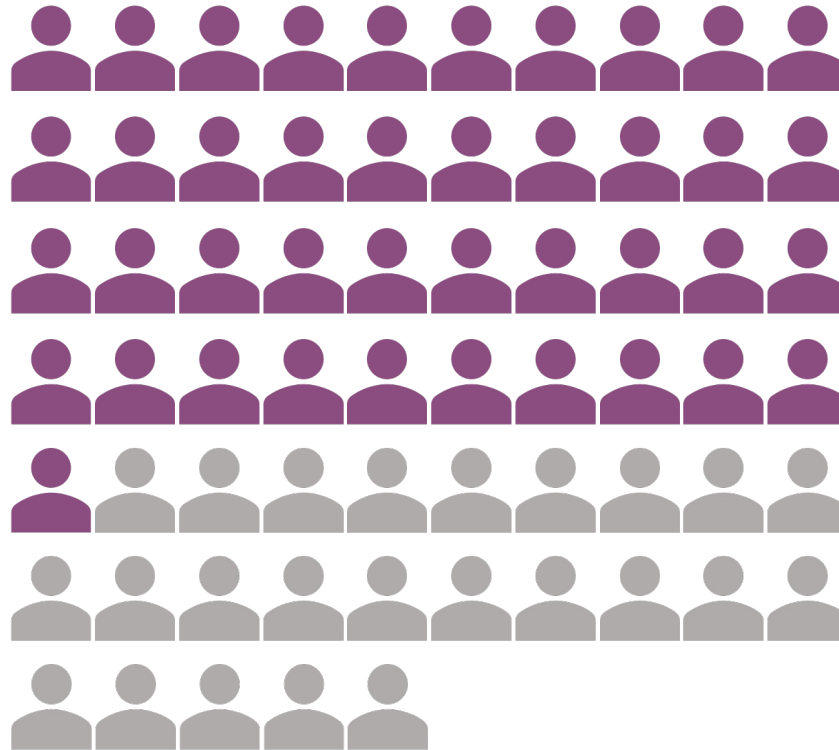
N = 39

63% *Acinetobacter baumannii* detected in ICU

Sputum n=18/41

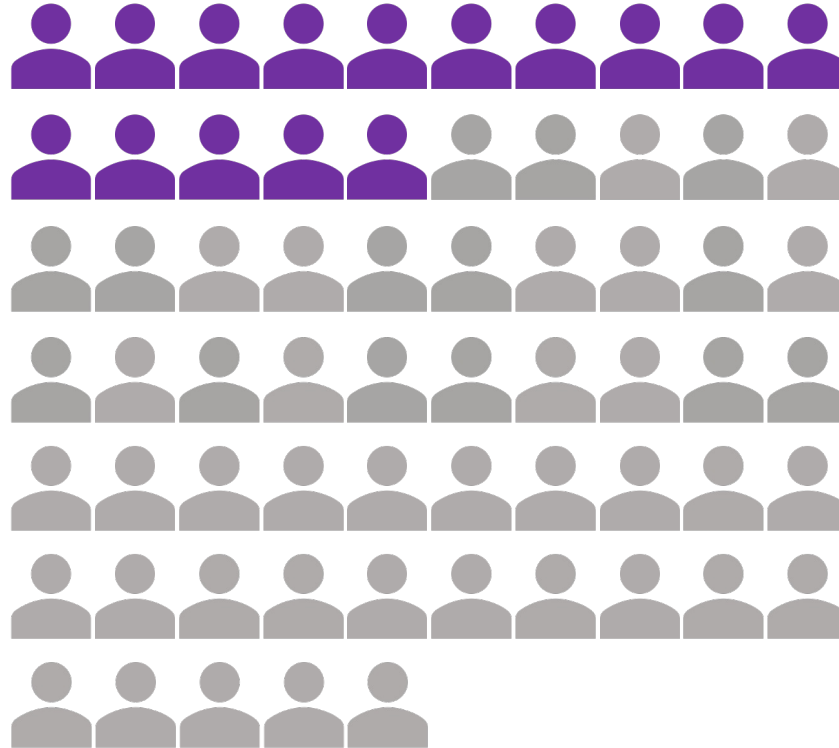
Urine n=17/41

Blood n=6/41



N = 41/65

22% *Klebsiella pneumoniae* detected in ICU



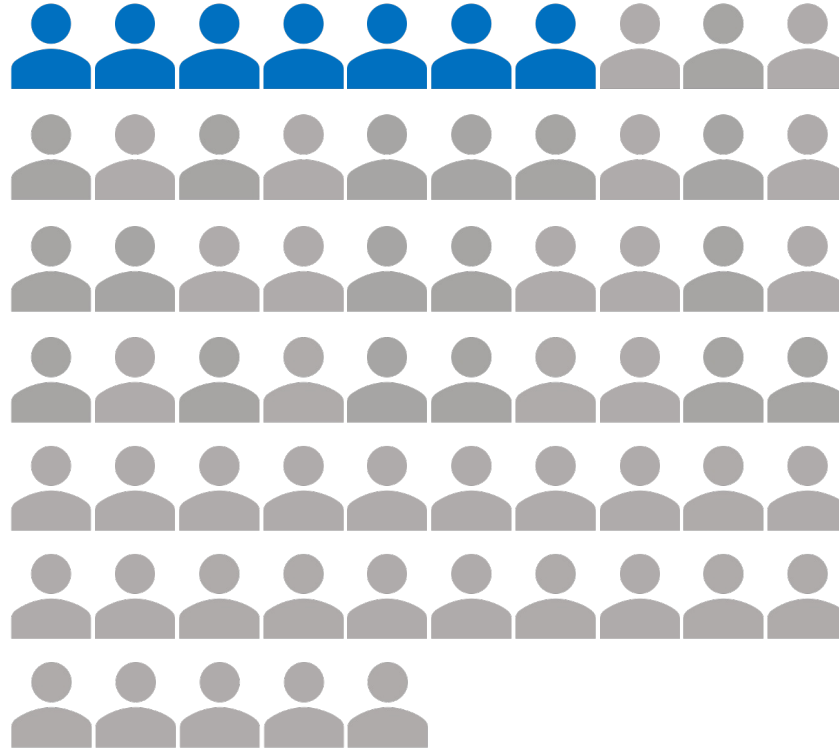
Sputum n=9/15

Urine n=3/15

Blood n=3/15

N = 15/65

11% *Staphylococcus aureus* detected in ICU



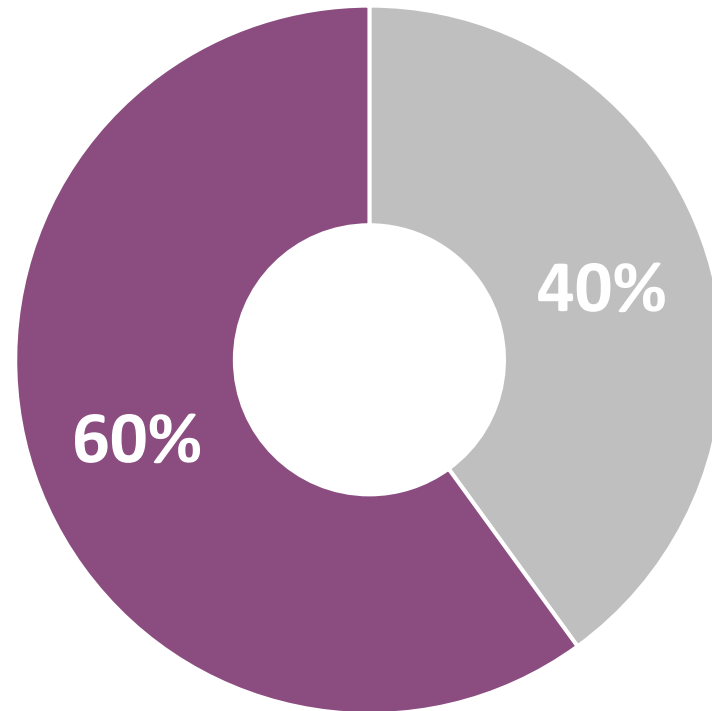
Sputum n=4/7

Urine n=2/7

Wound n=1/7

N = 7/65

60% of tested pathogens were resistant to the antibiotic prescribed



■ Sensitive

■ Resistant

N = 26

N = 39

Resistance table

	<i>A. baumannii</i>	
	Resistant	Sensitive
Ceftriaxone (n=34)	22 (65%)	12 (35%)
Ceftriaxone IV (n=3)	2 (67%)	1 (33%)
Meropenem (n=1)	1 (100%)	0 (0%)
Levofloxacin (n=1)	0 (0%)	1 (100%)
Amikacin (n=1)	1 (100%)	0 (0%)
Amoxicillin (n=1)	0 (0%)	1 (100%)

Resistance table

	<i>Klebsiella pneumoniae</i>	
	Resistant	Sensitive
Ceftriaxone (n=12)	7 (58%)	5 (42%)
Ceftriaxone IV (n=1)	1 (100%)	0 (0%)
Levofloxacin (n=1)	1 (100%)	0 (%)
Amoxicillin (n=1)	0 (0%)	1 (100%)

Resistance table

	<i>Staphylococcus aureus</i>	
	Resistant	Sensitive
Ceftriaxone (n=3)	2 (67%)	1 (33%)
Ceftriaxone IV (n=1)	0 (%)	1 (100%)
Meropenem (n=3)	2 (67%)	1 (33%)

Environmental swabs (*Pseudomonas aeruginosa*, *S. Haemolyticus*, *S. Hominis*)

	<i>Pseudomonas aeruginosa</i>	<i>S. Haemolyticus</i>	<i>S. Hominis</i>
ICU	ALV No.1 endotracheal tube Patient's bed	Patient's bed	
Stroke unit			Air in the ward
Infectious surge	Sink		

4th floor

Infectious surgery department		Gynecology department	
<i>A. baumannii</i>	5	<i>A. baumannii</i>	3
<i>K. pneumoniae</i>	2		
<i>S. aureus</i>	2		

Pathogens isolated in patients	Total
<i>Acinetobacter (A.) baumannii</i>	41
<i>Klebsiella (K.) pneumoniae</i>	15
<i>Staphylococcus (S.) aureus</i>	7
<i>Staphylococcus (S.) haemolyticus</i>	1

3rd floor

ICU №2		ICU №1		ICU (known infections)	
<i>A. baumannii</i>	6	<i>A. baumannii</i>	3	<i>A. baumannii</i>	5
<i>K. pneumoniae</i>	3	<i>K. pneumoniae</i>	1	<i>K. pneumoniae</i>	2
		<i>S. aureus</i>	2	<i>S. aureus</i>	2

2nd floor

Therapy department		Stroke unit		Procedure room		Urology department	
<i>A. baumannii</i>	6	<i>A. baumannii</i>	6			<i>A. baumannii</i>	7
<i>K. pneumoniae</i>	3	<i>K. pneumoniae</i>	3			<i>K. pneumoniae</i>	1
<i>S. haemolyticus</i>	1						

ICU= Intensive-care unit

Outbreak source and causes:

- Inadequate compliance with infection prevention measures, such as aseptic and antiseptic rules for medical procedures.
- Transfer of pathogens from other units or patients.
- The use of invasive procedures, such as catheter insertion and ALV, increases the risk of infection.
- Antibiotic resistance of pathogens can make treatment more difficult and time-consuming, increasing the risk of complications, including pneumonia.
- Inadequate disinfection and decontamination regimes for medical devices

During the investigation, we did not receive a clear clinical picture, which complicates identification of the specific source of the outbreak. However, we can assume that the spread of the infection could have been influenced by the identified pathogens.

Recommendations

- **Strengthening basic infection control practices such as hand hygiene and PPE use; surveillance; environment cleaning, and communication between providers (hospital units and patients)**
- **Understanding patient movement patterns and enhancing surveillance and reporting of hospital-acquired infections across hospitals, which will improve regional efforts to contain pathogen outbreaks and prevent outbreaks**
- **Control of antibiotic prescription before administration to patients, taking into account the determination of microorganism sensitivity**



Thank you for your attention!

