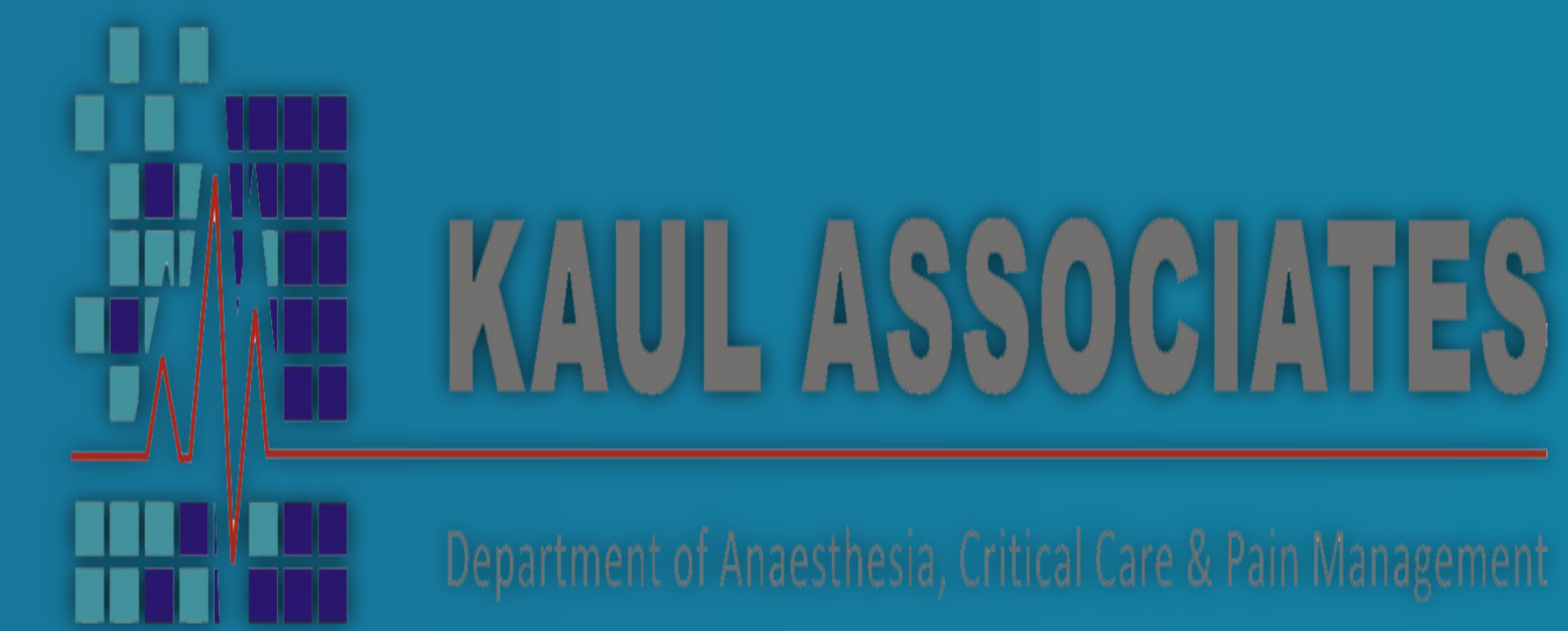# Ventilator associated pneumonia as biggest challenge: Incidence, risk factors, prevention and mortality rate in Surgical ICU.

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OBJECTIVE:

■ To find out the incidence of Ventilator acquired pneumonia (VAP), risk factors, Mortality rate and to find out the compliance of VAP CARE BUNDLE.

Introduction

- Ventilator associated pneumonia (VAP) is a type of nosocomial infection that affects the lung parenchyma of patients who are on invasive mechanical ventilation for period longer than 48 hours.
- VAP is further classified as early onset for period between 48-96 hours and late onset for period greater than 96 hours.
- VAP is most common nosocomial infection among ICU patients with incidence rate of 13-51 patients per 1000 Ventilator days.
- The most common organisms were MRSA, Pseudomonas, Acinetobacter and B-lactamase producing gram negative bacilli.
- VAP diagnosis is made on three criteria: 1) Clinical findings, which include fever, purulent sputum, raised leukocyte count, impaired oxygenation, unexplained hypotension or shock; 2)New, progressive and persistent radiological infiltrates, and 3)Microbiological cultures from lower respiratory tract showing positive results.
- Male gender, underlying illness severity, and patients with a history of trauma are the independent risk factors for VAP.
- Gram negative bacteria account for 60% of the VAP cases.
- VAP is associated with a significant mortality rate, estimated to be around 27%. The risk of VAP is maximum between the fifth to ninth day of mechanical ventilation.
- VAP prevention bundle comprises of steps which when implemented together, significantly reduces the incidence of VAP.
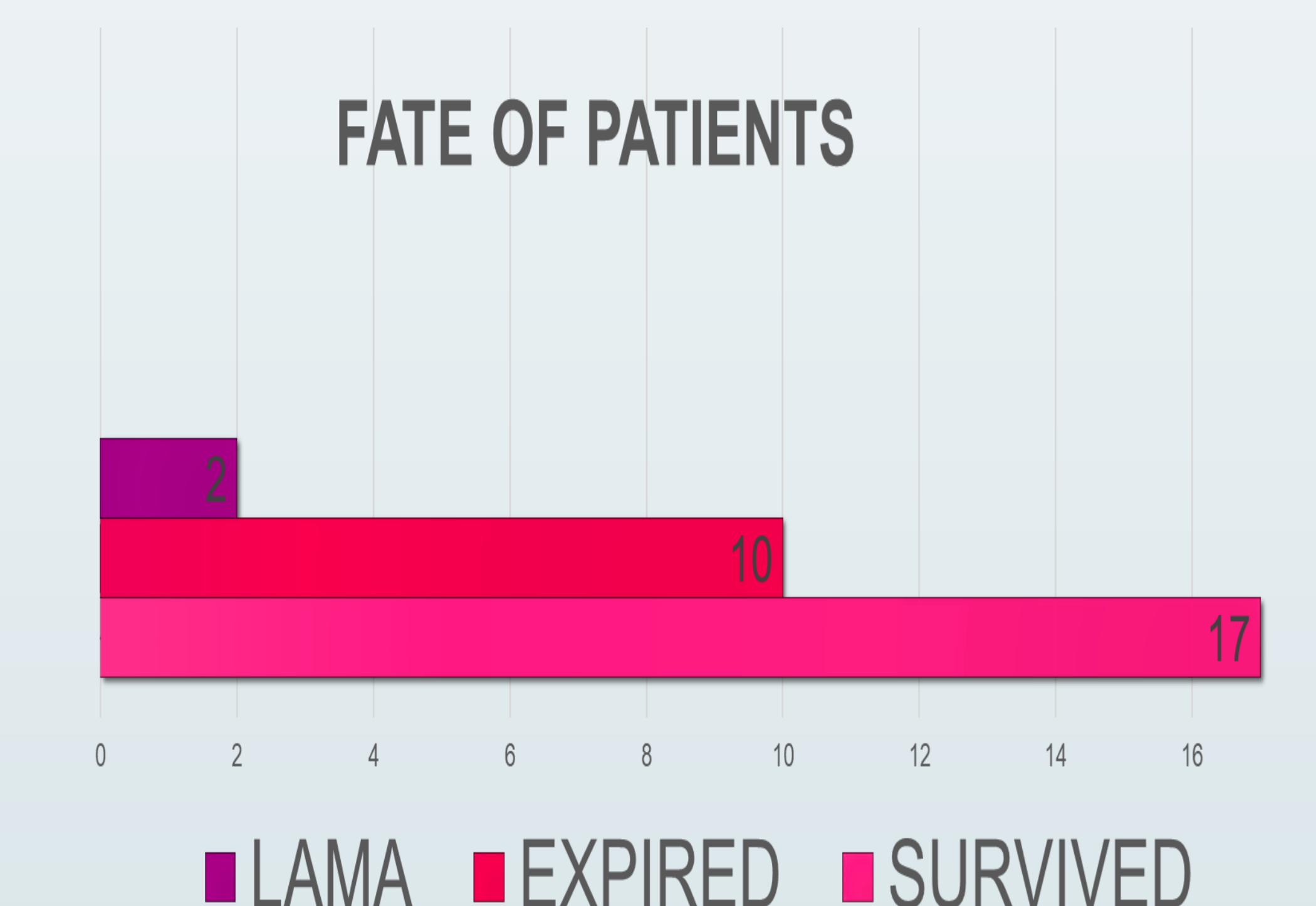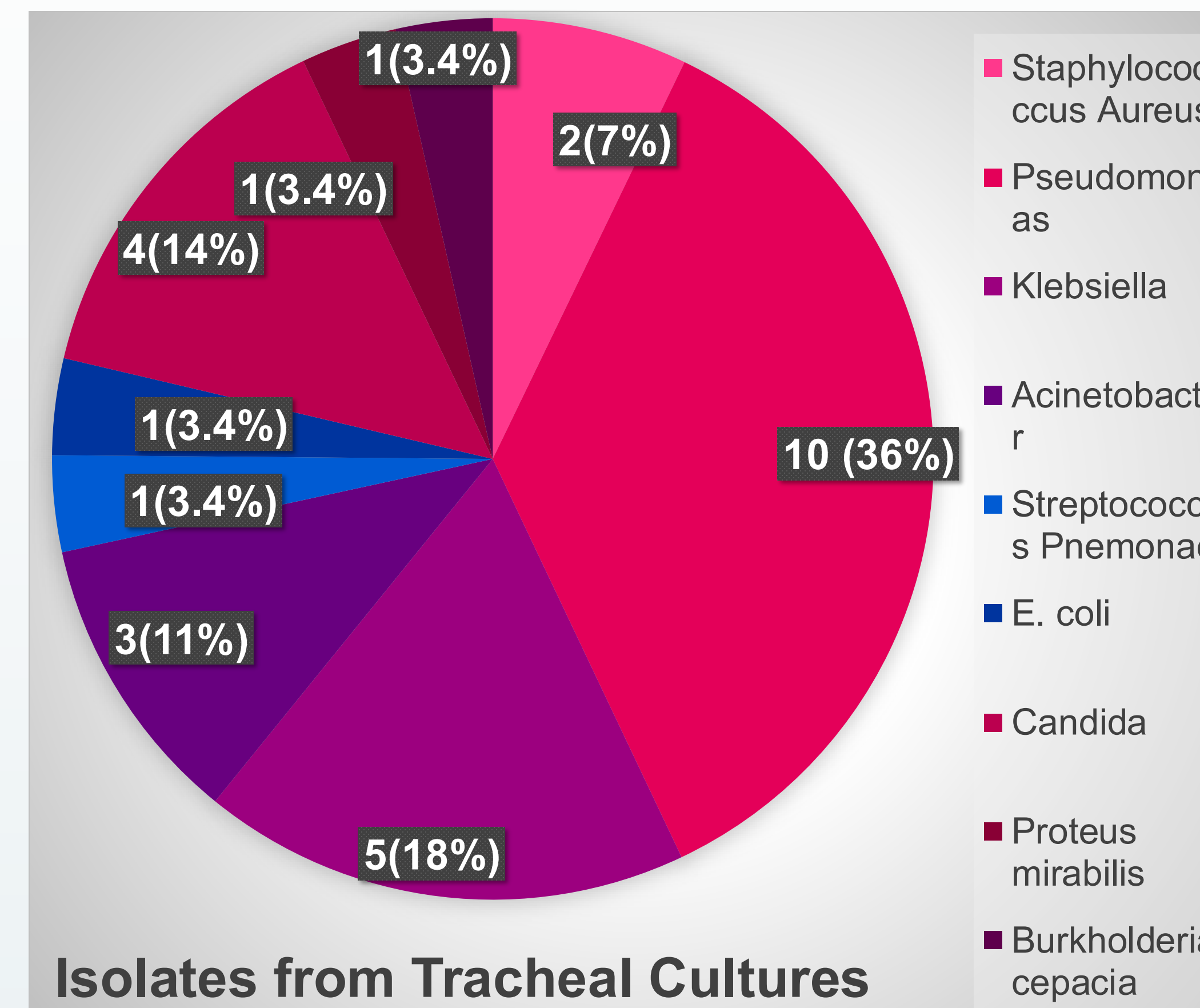
Methodology

- Retrospective clinical audit.
- Done at Surgical ICU (SICU) of Doctors Hospital and Medical Centre, Lahore, Pakistan over one year period from 1st January 2021 to 31st December 2023.
- Data was collected using non-probability consecutive sampling
- Exclusion criteria: pneumonia on admission, died within 48hours of admission and patients having acute respiratory distress syndrome (ARDS).
- Inclusion criteria: Patients of both genders (male and female) with age greater than 15 years, who were kept on mechanical ventilation for more than 48hours.
- Data was analyzed using SPSS 29.0 software version. P-value was set as <0.05 and confidence interval >95%.

Results

- A total of 213 patients were put on mechanical ventilation during our study period and 29 patients developed VAP.
- Total number of mechanical ventilation days were 871 and VAP rate came out to be 33.3 per 1000 ventilator days.
- Early-onset VAP constitutes 11 (37.9%) patients while late-onset VAP includes 18 (62%) patients.
- Mean days of mechanical ventilation for these 29 patients was 3.6 days.
- Out of the 29 patients, 19 (65.5%) had their GCS <9 at the time of intubation while rest of the 10 (34.4%) had their GCS >9.

Indication of mechanical ventilation	N	%age
Traumatic brain injury	15	51.7
Postoperative elective ventilation	5	17.2
Failure of ventilation (COPD)	4	13.8
Failure of oxygenation:Asthma/ARDS	3	10.3
Neurologically depressed sensorium secondary to CKD/ESRD/CLD	1	3.4
Metabolic diseases like D.K.A	1	3.4
Total	29	100.0

Isolates from Tracheal Cultures

Staphylococcus Aureus, Pseudomonas, Klebsiella, Acinetobacter, Streptococcus Pnemonae, E. coli, Candida, Proteus mirabilis, Burkholderia cepacia
10 (36%), 5(18%), 3(11%), 1(3.4%), 1(3.4%), 4(14%), 1(3.4%), 1(3.4%), 2(7%)

FATE OF PATIENTS

■ LAMA ■ EXPIRED ■ SURVIVED

Discussion

- The cumulative incidence of VAP came out to be 13.66% that is lower than studies from Istanbul (27%) and India (28%).
- The incidence of early and late-onset VAP in our study is 37.9% and 62.1%, respectively.
- Among the early-onset VAP, most common organisms in our study were Pseudomonas (4), Candida (4), E. Coli (1) Klebsiella (1) and Burkholderia (1), while among the late-onset VAP, most common organisms found were Pseudomonas (6), Klebsiella (4), Acinetobacter (3), Enterobacter (1), Staphylococcus (2), Proteus (1) and candida albicans (1).

- The risk factors in our study were male gender, length of stay on mechanical ventilation, GCS <9 & traumatic brain injuries correlating with Wu et al.
- Gram negative bacteria constitutes 72.4% of causative agents including Klebsiella, Pseudomonas, Acinetobacter, Proteus, Burkholderia and Enterobacter, correlating with Bandic-Pavlovic et al.
- Fundamental reasons behind the lack of efficacy of VAP bundle are incomplete compliance, non-adherence to infection control practices and multidrug resistance pattern of bacteria.
- Mortality rate in our study is 34.48%, that is on lower side of what was in the literature 30-70%.

Conclusion

- Ventilator associated pneumonia remains prevalent in ICU patients & is a public health issue.
- This study will help in planning infection control measures and prevention strategies which will help to redefine the policies to control the rate of VAP especially in developing countries and improve our practice in near future.

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