วารสาร
เทคนิคการแพทย์และกายภาพบำบัด
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นิพนธ์ต้นฉบับ
ORIGINAL ARTICLE

ความชุกของเชื้อแบคทีเรียที่แยกได้จากระบบทางเดินหายใจของผู้ป่วยที่เข้ารับการรักษาในโรงพยาบาลร้อยเอ็ด ระหว่างปี พ.ศ. 2558-2560

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บทคัดย่อ

โรคติดเชื้อฉวยโอกาสในโรงพยาบาลเป็นปัญหาสำคัญทางด้านสาธารณสุขทั่วโลก ผู้ป่วยที่ได้รับการติดเชื้อจะเพิ่มความยุ่งยากในการรักษาและมีความเสี่ยงต่อการเสียชีวิตเพิ่มสูงขึ้น ระบบทางเดินหายใจเป็นอวัยวะสำคัญที่พบการติดเชื้อฉวยโอกาสได้บ่อย **วัตถุประสงค์** เพื่อศึกษาความชุกของเชื้อแบคทีเรียที่แยกได้จากระบบทางเดินหายใจของผู้ป่วยที่เข้ารับการรักษาในโรงพยาบาลร้อยเอ็ดระหว่างปี พ.ศ. 2558 ถึง 2560 **วิธีการศึกษา** การศึกษาครั้งนี้เป็นการศึกษาเชิงพรรณนา โดยดำเนินการเก็บรวบรวมข้อมูลผลการตรวจเพาะเชื้อในระบบทางเดินหายใจจากห้องปฏิบัติการจุลชีววิทยาคลินิก กลุ่มงานเทคนิคการแพทย์ โรงพยาบาลร้อยเอ็ด ระหว่างปี พ.ศ. 2558-2560 โดยใช้สถิติเชิงพรรณนาในการวิเคราะห์ข้อมูล **ผลการศึกษา** ในปี พ.ศ. 2558 มีเชื้อที่แยกได้ทั้งหมด 5,203 isolates เชื้อที่แยกได้สูงสุด 5 ลำดับแรกได้แก่ *Acinetobacter baumannii* ร้อยละ 25.49 *Pseudomonas aeruginosa* ร้อยละ 19.03 *Klebsiella pneumoniae* ร้อยละ 12.01 *Klebsiella pneumoniae* (ESBL-producing strain) ร้อยละ 9.71 และ *Stenotrophomonas maltophilia* ร้อยละ 4.02 ในปี พ.ศ. 2559 มีเชื้อที่แยกได้ทั้งหมด 5,488 isolates เชื้อที่แยกได้สูงสุด 5 ลำดับแรกได้แก่ *Acinetobacter baumannii* ร้อยละ 28.37 *Pseudomonas aeruginosa* ร้อยละ 19.53 *Klebsiella pneumoniae* ร้อยละ 13.88 *Klebsiella pneumoniae* (ESBL-producing strain) ร้อยละ7.94 *Stenotrophomonas maltophilia* ร้อยละ 4.54 และปี พ.ศ. 2560 มีเชื้อที่แยกได้ทั้งหมด 5,964 isolatesเชื้อที่แยกได้สูงสุด 5 ลำดับแรกได้แก่ *Acinetobacter baumannii* ร้อยละ 27.05 *Klebsiella pneumoniae* ร้อยละ 20.86 *Pseudomonas aeruginosa* ร้อยละ 20.30 *Escherichia coli* ร้อยละ 5.42 *Stenotrophomonas maltophilia* ร้อยละ 4.98 **สรุปผลการศึกษา** ความชุกของเชื้อแบคทีเรียที่แยกได้จากสิ่งส่งตรวจระบบทางเดินหายใจของผู้ป่วยที่เข้ารับการรักษาในโรงพยาบาลร้อยเอ็ดมีค่อนข้างสูง โดยเชื้อที่พบได้บ่อยได้แก่ *Acinetobacter baumannii, Pseudomonas aeruginosa, Klebsiella pneumoniae, Stenotrophomonas maltophilia* และ *Escherichia coli*

คำสำคัญ: การติดเชื้อแบคทีเรีย, ระบบทางเดินหายใจ, สิ่งส่งตรวจ, ความชุก

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ORIGINAL ARTICLE

Prevalence of bacteria isolated from the respiratory tracts infection from clinical specimens of patients in Roi Et Hospital between 2015 to 2017

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Abstract

Nosocomial infection is seriously public health problem worldwide. The infection patients are complicate to treat and high risk of mortality. The respiratory tracts are the important organs of body that high prevalence of infections. Objective, to study the prevalence of bacteria isolated from the respiratory tracts infection from clinical specimens of patients in Roi Et Hospital between 2015 to 2017. Method, this study was descriptive study. All data were collected from the Division of Clinical Microbiology Laboratory, Roi Et Hospital during January 1, 2015 to December 31, 2017. All data were from clinical specimens of respiratory tract isolation. The descriptive statistical analyses were used. Results, in 2015, the totals were 5,203 isolates. The top five isolations were *Acinetobacter baumannii* 25.49%, *Pseudomonas aeruginosa* 19.03%, *Klebsiella pneumoniae* 12.01%, *Klebsiella pneumoniae* (ESBL-producing strain) 9.71%, *Stenotrophomonas maltophilia* 4.02%. In 2016, the totals were 5,488 isolates. The top five isolation were *Acinetobacter baumannii* 28.37%, *Pseudomonas aeruginosa* 19.53%, *Klebsiella pneumoniae* 13.88%, *Klebsiella pneumoniae* (ESBL-producing strain) 7.94%, *Stenotrophomonas maltophilia* 4.54%. In 2017, the totals were 5,964 isolates. The top five isolations were *Acinetobacter baumannii* 27.05%, *Klebsiella pneumoniae* 20.86 %, *Pseudomonas aeruginosa* 20.30%, *Escherichia coli* 5.42%, *Stenotrophomonas maltophilia* 4.98%. Conclusion, the prevalence of bacteria isolated from respiratory tracts infection in Roi Et Hospital was high. The most commonly pathogens isolated were *Acinetobacter baumannii, Pseudomonas aeruginosa, Klebsiella pneumoniae, Stenotrophomonas maltophilia* and *Escherichia coli*.

Keywords: Bacterial infection, Respiratory tract system, Clinical specimens, Prevalence

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Introduction

The nosocomial infection is the majority public health problem in Thailand and other countries worldwide. [1-4]The bacterial can infect among respiratory tracts, digestive, urinary tract and blood stream systems. Nowadays, the problems of antimicrobial resistant were widely found. The majority antimicrobial resistant was found among *Staphylococcus aureus* resistant to methicillin, *Escherichia coli* and *Klebsiella pneumoniae* resistant to ceftazidime, ceftriaxone, imipenem, ciprofloxacin, and gentamicin. *Acinetobacter baumannii* and *Pseudomonas aeruginosa* resistant to piperacillin, imipenem, meropenem, ciprofloxacin and piperacillin-tazobactam. [1,4-7]

The respiratory tracts system is an important organ that frequencies found bacterial infection especially in patients undergone with invasive medical devices. The most of pathogens causing respiratory tract infection are Coagulase-negative staphylococci, *Streptococcus pneumoniae*, *Haemophilus influenza*, *Escherichia coli*, *Klebsiella species*, methicillin-resistant *Staphylococcus aureus*, *Staphylococcus aureus*, *Enterococcus species*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Acinetobacter baumannii, Legionella pneumophila*.[8-11]

The Roi Et Hospital is the regional hospital that services patients in Roi Et province and other provinces nearby. At the present the bacterial infection is a serious problem because it is complicated to treat and lead to treatment failure especially those pathogens resistant to antibiotics. The previous studies report that respiratory *tract* system is the organ that high prevalence of bacterial infection but has non-previously study reported from Roi Et Hospital. The aimed of this study was to study the prevalence of bacteria isolated from respiratory tracts infection from clinical specimens of patients in Roi Et Hospital between 2015 to 2017. The beneficial of this study were to describe type of organism that cause of infection and the prevalence of each organisms.

Methods

Study design

The study design of this study was descriptive study. All data were collected from Roi Et Hospital, Roi Et Province, Thailand.

The populations

All of patients who were admitted at Roi Et Hospital, Roi Et Province during January 1, 2015 to December 31, 2017.

The study subjects

Clinical specimens from respiratory tract system of patients who were admitted at Roi Et Hospital during January 1, 2013 to December 31, 2017. The clinical specimens including nasal swabs, nasopharyngeal / pernasal swabs, nasopharyngeal aspirates, nasal washings, oropharyngeal swab cultures, throat swabs, sputum cultures, tracheostomy and endotracheal aspirations, transtracheal aspiration, bronchos copy specimens and lung aspirations. All data collection process and laboratory tests were conducted at Division of Clinical Microbiology Laboratory, Roi Et Hospital. Data were retrieved from MLAB program during May 1, 2018 to June 30, 2018.

The criteria of study subjects

The inclusion criteria of study subjects were the clinical specimens from respiratory tract system of patient who were culture positive for Gram positive cocci, Gram negative bacilli and Gram positive bacilli. The exclusion criteria were positive cultivation for yeast and normal flora.

The data collection process

After the ethical committee of Roi Et Hospital was approve and the director allowed for data collection at Division of Clinical Microbiology Laboratory, then all data were retrieved from MLAB program, data checking and preparation for data analysis.

The ethical consideration

This study was approved by the Roi Et Hospital Ethical Committee for Human Research. The references number is 037/2561.

The statistical analysis

The statistical analyses of this study were descriptive statistics and STATA version 12.0 program were used.

Results

The prevalence of bacterial respiratory tract isolation in 2015

In 2015, the total numbers of bacterial respiratory tract isolation were 5,203 isolates. The top ten of bacterial isolation were *Acinetobacter baumannii* 25.49%, *Pseudomonas aeruginosa* 19.03%, *Klebsiella pneumoniae* 12.01%, *Klebsiella pneumoniae* (ESBL-producing strain) 9.71%, *Stenotrophomonas maltophilia* 4.02%, *Escherichia coli* (ESBL-producing strain) 3.57%, *Staphylococcus aureus* 3.27%, *Escherichia coli* 2.71%, Coagulase Negative Staphylococci 2.54 % and *Enterobacter cloacae* 2.27%, respectively. Data showed in **Table1.**

The prevalence of bacterial respiratory tract isolation in 2016

In 2016, the total numbers of bacterial respiratory tract isolation were 5,488 isolates. The top ten of bacterial isolation were *Acinetobacter baumannii* 28.37%, *Pseudomonas aeruginosa* 19.53%, *Klebsiella pneumoniae* 13.88%, *Klebsiella pneumoniae* (ESBL-producing strain) 7.94%, *Stenotrophomonas maltophilia* 4.54%, *Escherichia coli* 3.50%, *Escherichia coli* (ESBL-producing strain) 3.50%, *Staphylococcus aureus* 3.12%, *Enterobacter spp*. 1.93%, and Klebsiella spp. 1.64%, respectively. Data showed in **Table 2.**

The prevalence of bacterial respiratory tract isolation in 2017

In 2017, the total numbers of bacterial respiratory tract isolation were 5,964 isolates. The top ten of bacterial isolation were Acinetobacter baumannii 27.05%, Klebsiella pneumoniae 20.86%, Pseudomonas aeruginosa 20.30%, Escherichia coli 5.42%, Stenotrophomonas maltophilia 4.98%, Staphylococcus aureus 2.79%, Enterobacter spp. 2.66%, Acinetobacter spp.1.97%, Enterococcus spp.1.86%, and Enterobacter cloacae 1.59%, respectively. Data showed in Table 3.

Table 1 The prevalence of bacterial respiratory tract isolation in 2015

Order	Organism	Number (n=5,203)	Percentage (%)
1	*Acinetobacter baumannii*	1,326	25.49
2	*Pseudomonas aeruginosa*	990	19.03
3	*Klebsiella pneumoniae*	625	12.01
4	*Kleb.pneumoniae (ESBL-producing strain)*	505	9.71
5	*Stenotrophomonas maltophilia*	209	4.02
6	*Escherichia coli (ESBL-producing strain)*	186	3.57
7	*Staphylococcus aureus*	170	3.27
8	*Escherichia coli*	141	2.71
9	*Coagulase Negative Staphylococci*	132	2.54
10	*Enterobacter cloacae*	118	2.27
11	*Enterobacter spp.*	114	2.19
12	*Acinetobacter lwoffii*	74	1.42
13	*Klebsiella spp.*	72	1.38
14	*Proteus mirabilis*	69	1.33
15	*Enterococcus spp.*	65	1.25
16	Others	382	7.35

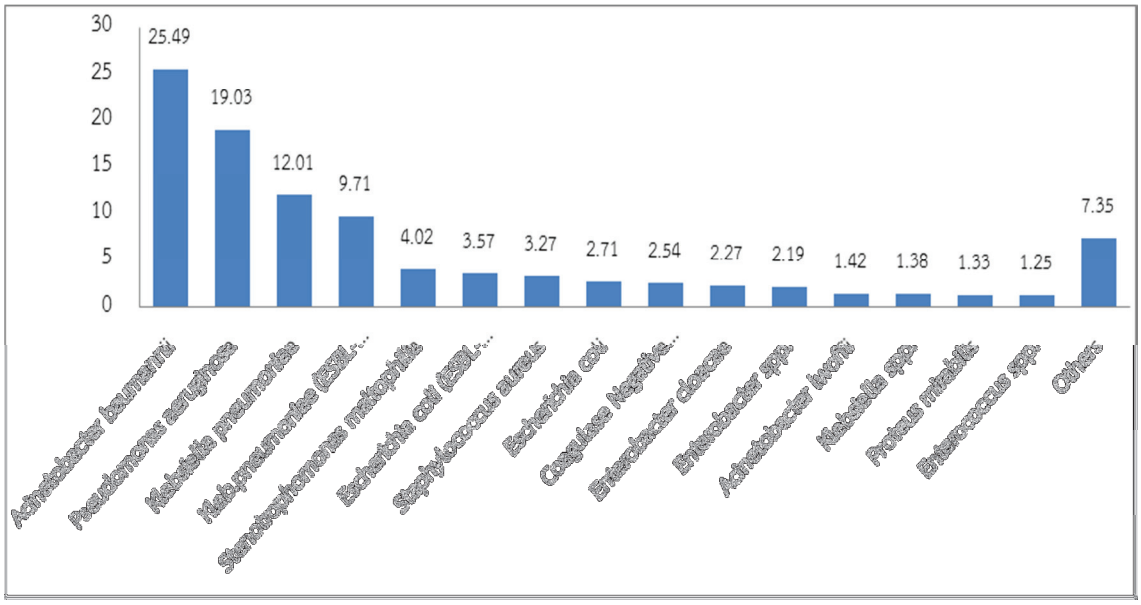

Figure 1 Prevalence of bacterial respiratory tract isolation in 2015

Table 2 The prevalence of bacterial respiratory tract isolation in 2016

Order	Organism	Number (n=5,488)	Percentage (%)
1	*Acinetobacter baumannii*	1,557	28.37
2	*Pseudomonas aeruginosa*	1,072	19.53
3	*Klebsiella pneumoniae*	762	13.88
4	*Kleb.pneumoniae (ESBL-producing strain)*	436	7.94
5	*Stenotrophomonas maltophilia*	249	4.54
6	*Escherichia coli*	192	3.50
7	*Escherichia coli (ESBL-producing strain)*	192	3.50
8	*Staphylococcus aureus*	171	3.12
9	*Enterobacter spp.*	106	1.93
10	*Klebsiella spp.*	90	1.64
11	*Coagulase Negative Staphylococci*	80	1.46
12	*Enterobacter cloacae*	77	1.40
13	*Enterococcus spp.*	61	1.11
14	*Proteus mirabilis*	58	1.06
15	*Burkholderia pseudomallei*	51	0.93
16	Others	334	6.08

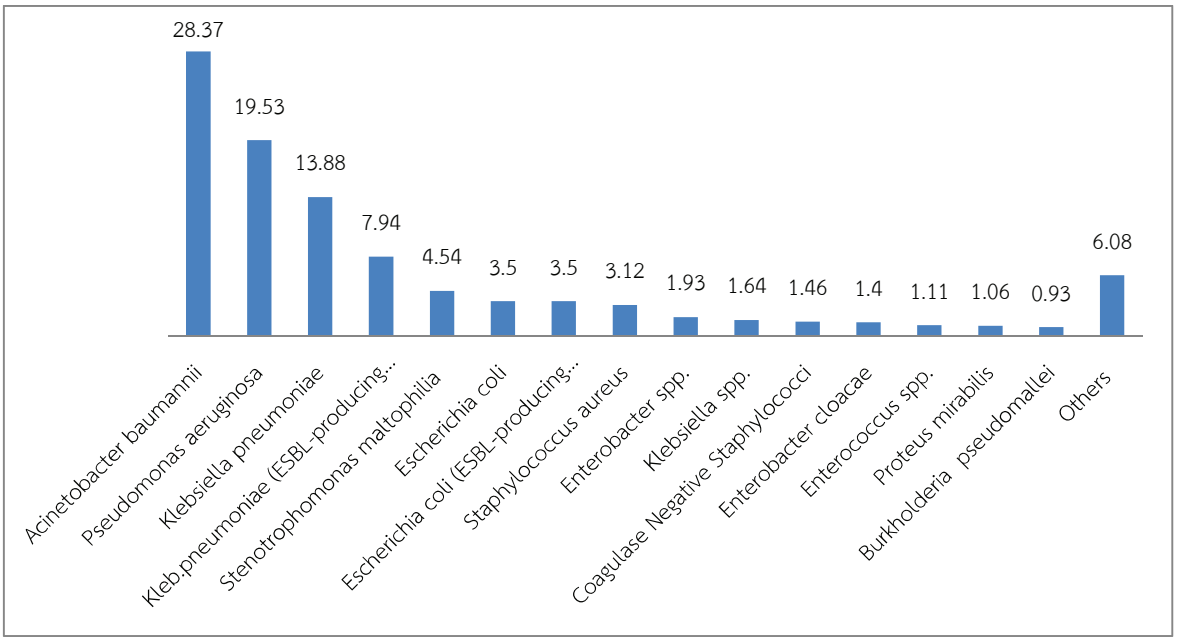

Figure 2 Prevalence of bacterial respiratory tract isolation in 2016

Table 3 The prevalence of bacterial respiratory tract isolation in 2017

Order	Organism	Number (n=5,964)	Percentage (%)
1	*Acinetobacter baumannii*	1,646	27.05
2	*Klebsiella pneumoniae*	1,269	20.86
3	*Pseudomonas aeruginosa*	1,235	20.30
4	*Escherichia coli*	330	5.42
5	*Stenotrophomonas maltophilia*	303	4.98
6	*Staphylococcus aureus*	170	2.79
7	*Enterobacter spp.*	162	2.66
8	*Acinetobacter spp.*	120	1.97
9	*Enterococcus spp.*	113	1.86
10	*Enterobacter cloacae*	97	1.59
11	*Klebsiella spp.*	96	1.58
12	*Proteus mirabilis*	94	1.55
13	*Burkholderia pseudomallei*	61	1.00
14	*Acinetobacter lwoffii*	54	0.89
15	*Citrobacter diversus*	37	0.61
16	Others	177	4.88

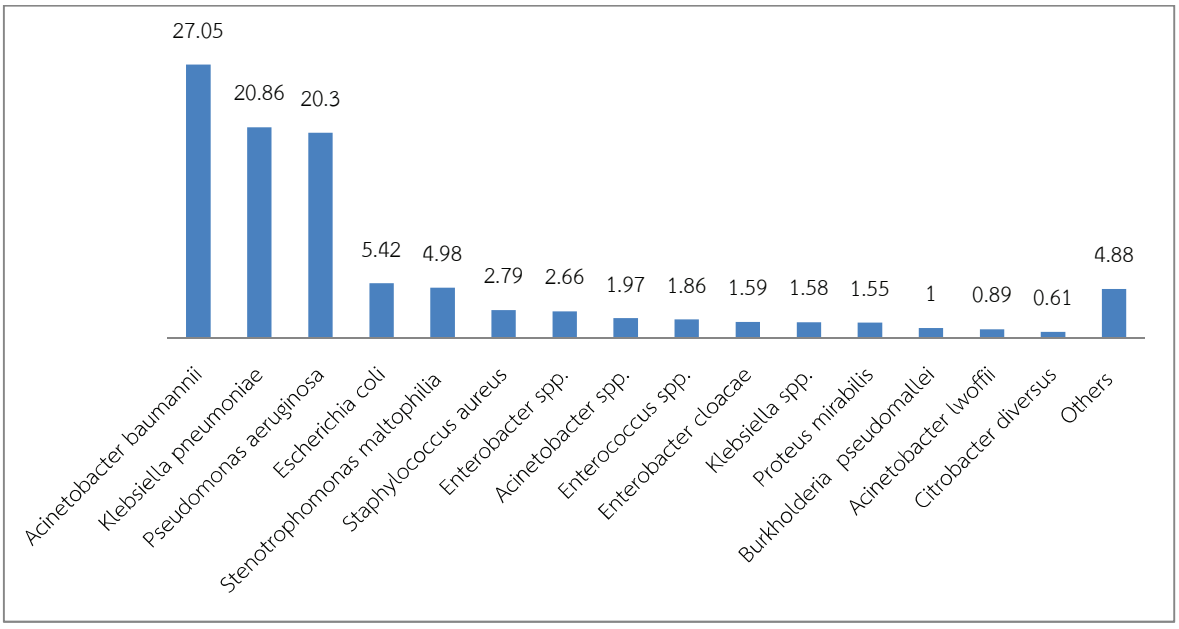

Figure 3 Prevalence of bacterial respiratory tract isolation in 2018

Discussion

The objective of this study was to investigate prevalence of bacterial respiratory tract infections among patients at Roi Et Hospital during 2015 to 2017. This study found that the most common pathogens isolations during 3 years were *Acinetobacter baumannii, Klebsiella pneumoniae, Pseudomonas aeruginosa, Stenotrophomonas maltophilia* and *Escherichia coli.* It is consistency with many previous studies reported. The study from Taiwan, they found the most common bacterial respiratory tract infection were *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Acinetobacter baumannii*.[12] And also consistency with study at Nepal, Pakistan and India with they found high prevalence of *Klebsiella pneumoniae, Acinetobacter baumannii, Escherichia coli, Pseudomonas aeruginosa, Acinetobacter spp., Stenotrophomonas maltophilia,* and *Burkholderia cepacia.* [13-17]

This study also inconsistency with previous studies at Saudi Arabia and Israel which found the high prevalence of bacterial respiratory *Haemophilus influenzae*, *Klebsiella pneumoniae, Streptococcus pneumoniae*, *Staphylococcus aureus, Moraxella catarrhalis* and *Staphylococcus pyogenes*.[9] [18-19] The study at Japan, China and Hong Kong were found high prevalence of *Streptococcus pneumoniae, Haemophilus influenzae, Staphylococcus aureus, Moraxella catarrhalis, Pseudomonas aeruginosa and Haemophilus parainfluenzae*.[10,11,20, 21] And different from Latin America, the majority pathogens cause of nosocomial respiratory tract infections were found *Streptococcus pneumoniae, Moraxella catarrhalis, Haemophilus influenza, Staphylococcus aureus* and *Staphylococcus pyogenes.* [22]

This study also presents that high prevalence of nosocomial bacterial infection were found in each year and can use to be evident base for the Department of infection control of Roi Et Hospital for planning about infection control program to reduce the infection rate of patients in the hospital. However, several limitations were found in this study. First, this study has been reported about prevalence of nosocomial infection not reported about factors associated with nosocomial infection. Second, this study was not reported on the antimicrobial susceptibility test of each type of bacteria. Third, in 2017 this study was not reported about ESBL-producing strain of *Klebsiella pneumoniae* and *Escherichia coli* because these two types of bacteria often found in the laboratory. Therefore, for next study investigation about the antibiotics susceptibility pattern and the risk factors of infection of each bacteria should be performed. The strange of this study is that the data was from MLAB program that Microbiology Laboratory used which we can collect all data and reported of actually prevalence of nosocomial bacteria.

Conclusion

The prevalence of nosocomial respiratory tract infection at Roi Et Hospital was high in each year. The most commonly pathogens isolated were *Acinetobacter baumannii, Pseudomonas aeruginosa, Klebsiella pneumoniae*, *Stenotrophomonas maltophilia* and *Escherichia coli.*

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