Epidemiological Data and Anti-Microbial Resistance of Nosocomial Spontaneous Bacterial Peritonitis: A Systematic Review and Meta-Analysis

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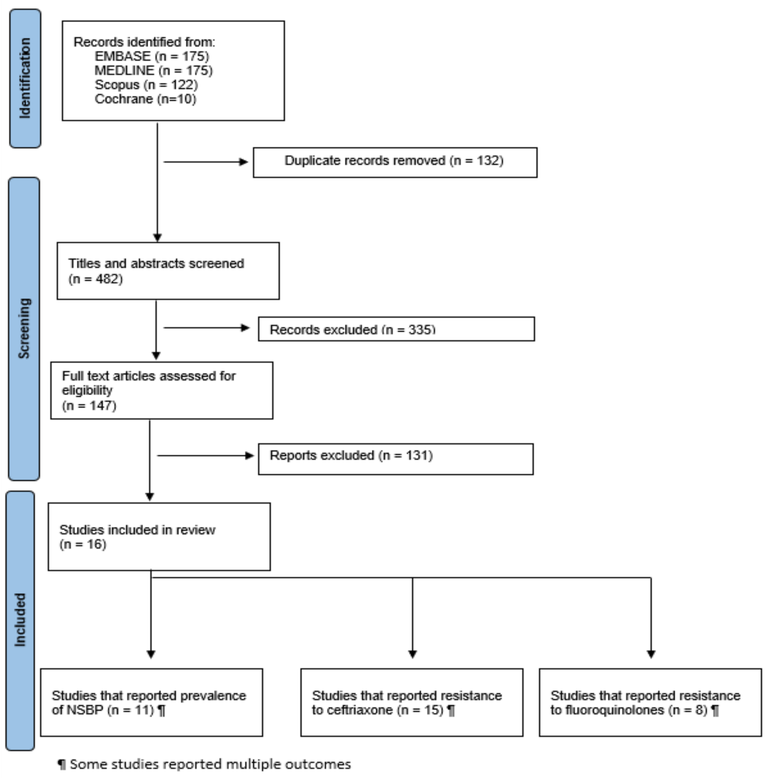
Introduction

- Nosocomial Spontaneous Bacterial Peritonitis (NSBP) incidence has been on the rise due to frequent hospitalizations in the cirrhotic population along with rampant antibiotics use
- There has been a shift in the bacterial spectrum including resistance profile with emergence of Multi Drug Resistant Organisms
- The incidence of NSBP has not been studied
- Furthermore, the rate of resistance to first-line agents in management of SBP is not well reported in NSBP
- Thus, we conducted a systematic review and meta-analysis of available literature.

Methods

- We conducted a comprehensive literature review of MEDLINE, EMBASE, Cochrane, and Scopus databases
- Studies included in the systematic review met the following inclusion criteria: adult patients, age >18 years, with a diagnosis of NSBP
- NSBP was diagnosed as SBP diagnosed after at least 48 hours of hospitalization
- Exclusion criteria: Manuscripts with <5 patients, no report of prevalence of NSBP or the incidence of MDRO in NSBP
- Pooled estimates were calculated following the restricted maximum likelihood method using random effects model. Heterogeneity was reported as I^2

Figure 1. Flowchart of identifying relevant articles

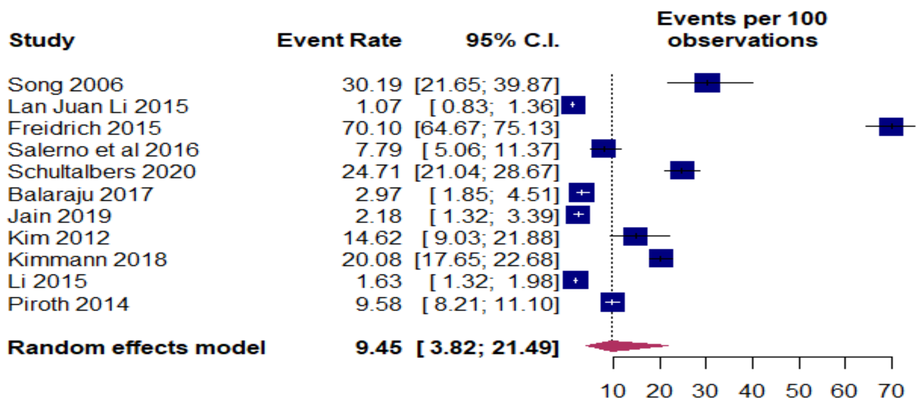


Results

Table 1. Study characteristics

Study (Year)	Age (years)	Number of patients with cirrhosis	Number of patients with NSBP	Number of patients resistant to third generation cephalosporins	Number of patients resistant to Fluoroquinoles
Friedrich et al (2015)	57	311	218	Not specified (NS)	NS
Salerno et al (2016)	NS	308	24	NS	NS
Shultablers et al (2020)	56±11	514	127	NS	NS
Balaraju et al (2017)	48.4±14	706	21	NS	NS
Jain et al (2019)	48 (29-71)	870	19	NS	NS
Kim et al (2012)	50.1±9.4	130	19	1	NS
Kimmann et al (2018)	56 (49-63)	1011	203	NS	NS
Song et al (2006)	58 (8.7)	106	32	14	8
Lan Juan Li et al (2015)	55 (23-79)	6086	65	11	19
Elshamy et al (2022)	45 (30-80)	NS	68	13	12
Lutz et al (2016)	59 (51-69)	NS	63	9	14
Bert et al (2003)	50 (26-80)	NS	53	13	22
Ding et al (2019)	56.3±10.3	NS	155	27	23
Chon et al (2014)	NS	NS	NS	NS	NS
Piroth et al (2014)	NS	1659	NS	72	62

Figure 2. Prevalence of NSBP



- **Figure 1** shows the flowchart of identifying relevant articles
- **Table 1** summarizes the study characteristics
- The pooled incidence of NSBP was 9.45% [95% confidence interval (CI) 3.82-21.49%; I^2 99.40%] (**Figure 2**)
- The pooled clinical success rate was 82.32% (95% CI 74.90-87.89%, I^2 0)
- The pooled incidence of resistance to ceftriaxone was 27.72% (95% CI 2.13-35.26%; I^2 84.52%)
- The pooled incidence of resistance to fluoroquinolones was 24.71% (95% CI 18.19-32.64%; I^2 80.25%)

Discussion

- The incidence of NSBP in patients with cirrhosis is relatively high
- The rates of bacterial resistance to the first-line anti-microbial agents used to treat SBP (i.e., ceftriaxone/fluoroquinolones) is exceptionally high in this patient population
- Thus, in patients with NSBP who fail to improve, providers should have a high level of suspicion for drug-resistance being a contributing factor
- Furthermore, the high resistance rates to fluoroquinolones in NSBP should be taken into consideration when placing this patient population on secondary prophylaxis.