

# INPLASY PROTOCOL

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**Support:** Process No. 2017JY0334.

**Review Stage at time of this submission:** The review has not yet started.

## Conflicts of interest:

None declared.

## Early prediction models for Extended-spectrum $\beta$ -lactamase-producing Escherichia coli infection in emergency department: A protocol for systematic review and meta-analysis

Zhou, Y<sup>1</sup>.

**Review question / Objective:** Resistance in gram-negative bacteria has gained great importance in recent decades and one reason is the rapid increase of extended spectrum  $\beta$ -lactamase (ESBL)-producing bacteria as a growing problem worldwide. The increasing proportion of ESBL-producing Enterobacteriaceae (ESBL-E) infections acquired in the emergency community is a new feature of ESBLs epidemiology. Early recognition of patients with extended-spectrum  $\beta$ -lactamase-producing Escherichia coli infection is important in the emergency department. To mitigate the burden on the healthcare system, while also providing the best possible care for patients, early recognition the infection is needed.

**Condition being studied:** This systematic review and meta-analysis will evaluate the value of the early prediction models for Extended-spectrum  $\beta$ -lactamase-producing Escherichia coli infection in emergency department.

**INPLASY registration number:** This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 15 March 2021 and was last updated on 15 March 2021 (registration number INPLASY202130049).

## INTRODUCTION

**Review question / Objective:** Resistance in gram-negative bacteria has gained great importance in recent decades and one reason is the rapid increase of extended spectrum  $\beta$ -lactamase (ESBL)-producing

bacteria as a growing problem worldwide. The increasing proportion of ESBL-producing Enterobacteriaceae (ESBL-E) infections acquired in the emergency community is a new feature of ESBLs epidemiology. Early recognition of patients with extended-spectrum  $\beta$ -lactamase-

producing *Escherichia coli* infection is important in the emergency department. To mitigate the burden on the healthcare system, while also providing the best possible care for patients, early recognition the infection is needed.

**Rationale:** For the acquisition of required data of eligible prospective/retrospective cohort study or randomized controlled trials (RCTs), we will search for publications from PubMed, Web of science, EMBASE, Cochrane Library, Google scholar. Two independent reviewers will read the full English text of the articles, screened and selected carefully, removing duplication. Then we evaluate the quality and analyses data by Review Manager (V.5.4). Results data will be pooled and meta-analysis will be conducted if there's 2 eligible studies considered.

**Condition being studied:** This systematic review and meta-analysis will evaluate the value of the early prediction models for Extended-spectrum  $\beta$ -lactamase-producing *Escherichia coli* infection in emergency department.

## METHODS

**Search strategy:** At first, the collection of bibliographic data will be made in the electronic databases: PubMed, Web of science, EMBASE, Cochrane Library, Google scholar. We use the available publications of the Extended-spectrum  $\beta$ -lactamase-producing *Escherichia coli* infection systematic review for a list of keywords. The words are considered: Extended-spectrum  $\beta$ -lactamase-producing, *Escherichia coli*, infection, emergency department, Grippe, prognostic, prediction, prediction model, regression, score, artificial intelligence, algorithm, deep learning, machine learning. We make the search terms by combining the words above: #1 Extended-spectrum  $\beta$ -lactamase-producing, OR ESBL #2 *Escherichia coli*, OR *E. coli* #3 diagnostic OR imaging OR prognostic OR prognosis OR prediction OR prediction model OR mortality OR regression OR score OR artificial intelligence OR algorithm OR deep

learning OR machine learning #4 emergency department OR ED OR emergency medical service OR emergency room #5 English NOT animal NOT children NOT child NOT pediatric NOT pediatrics NOT pregnant NOT pregnant woman NOT pregnant women NOT pregnancy NOT gravida NOT gravidity NOT meternal #1 AND #2 AND #3 AND #4 AND #5.

**Participant or population:** Adult.

**Intervention:** Patients with Extended-spectrum  $\beta$ -lactamase-producing *Escherichia coli* infection.

**Comparator:** Patients without Extended-spectrum  $\beta$ -lactamase-producing *Escherichia coli* infection.

**Study designs to be included:** The study includes adolescent participants, but children or pregnant women doesn't meet the inclusion criteria. Animal studies, cadaver studies, case reports, comments, letters, protocols, guidelines, unpublished articles, and review papers will be excluded. No matter where the articles come from, We only review articles in English. Participants who are included in the articles we selected should be diagnosed with Extended-spectrum  $\beta$ -lactamase-pr.

**Eligibility criteria:** The study includes adolescent participants, but children or pregnant women doesn't meet the inclusion criteria. Animal studies, cadaver studies, case reports, comments, letters, protocols, guidelines, unpublished articles, and review papers will be excluded. No matter where the articles come from, We only review articles in English. Participants who are included in the articles we selected should be diagnosed with Extended-spectrum  $\beta$ -lactamase-producing *Escherichia coli* infection.

**Information sources:** The collection of bibliographic data will be made in the electronic databases: PubMed, Web of science, EMBASE, Cochrane Library, Google scholar.

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**Main outcome(s):** Risk of infection due to Extended-spectrum  $\beta$ -lactamase-producing *Escherichia coli*.

**Quality assessment / Risk of bias analysis:** The Grading of Recommendations, Assessment, Development and Evaluation (GRADE) assessment tool will be used for conducting an appraisal of the studies' methodological quality. Every selected study will be evaluated by 2 reviewers independently, a third one as a consultant. The GRADE evaluation system included bias risk; heterogeneity; indirectness; imprecision; publication bias. And each level of evidence is divided into "very low", "low", "moderate", or "high" judgment.

**Strategy of data synthesis:** For qualified articles, we would like to combine the collected data according to characteristics of eligible trials. In line with the Cochrane guideline, we will express risk ratio with 95% confidence intervals (95%CI) using fixed effect model. Besides the random effect model will be used for continuous outcomes because of clinical heterogeneity. Statistical heterogeneity will be investigated using  $\chi^2$  test and I<sup>2</sup> statistic (50%, strong heterogeneity). We will assess possible publication bias using the Egger funnel plot. All data will be performed by using Review Manager (RevMan version 5.4.0) software and P value < 0.5 will be considered statistically significant.

**Subgroup analysis:** Patients with Extended-spectrum  $\beta$ -lactamase-producing *Escherichia coli* infection and patients without Extended-spectrum  $\beta$ -lactamase-producing *Escherichia coli* infection.

**Sensitivity analysis:** Two of three reviewers will extract the data from eligible studies, putting them into the pre-specified form that we make in advance: author information, study area, study time, study type, study design, setting of study, sample size, participant characteristics, primary and secondary outcomes (needing for mechanical ventilation, needing for ICU care, or dead), AUC (Area Under Curve).

Another researcher will solve the divergence between the first two reviewers.

**Language:** English.

**Country(ies) involved:** China.

**Keywords:** prediction models; extended-spectrum;  $\beta$ -lactamase; *Escherichia coli*; protocol; systematic review; meta-analysis.

**Contributions of each author:**

Author 1 - Yiwu Zhou.