INPLASY

META analysis of the incidence of nosocomial infection in carbapenem resistant Enterobacteriaceae colonization cases by active screening

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INTRODUCTION

*R*eview question / Objective To systematically evaluate the incidence of nosocomial infection in Carbapenem resistant Enterobacteriaceae (CRE) colonization cases, so as to provide reference basis for prevention and control of nosocomial infection in CRE colonization cases.

Condition being studied The infection/colonization caused by CRE has become an important global challenge, and the infection caused by CRE is also one of the most eye-catching issues in the field of anti infection. Therefore, preventing CRE infection and its transmission has become an important infection control goal. One of the potential endogenous hosts of CRE is the human intestinal site. Currently, the colonization rate of CRE is high, and its incidence of hospital infection is much higher than that of the non colonization group. Colonized CRE has been considered an important risk factor for

systemic infection of CRE. However, there are significant differences in the incidence of hospital infection in CRE colonization cases reported in different studies. There are also issues with limited research areas, different research subjects, and small sample sizes in related studies, which cannot reflect the overall status of hospital infection in CRE colonization cases. The data lacks representativeness. Therefore, evaluating the overall level of hospital infection incidence in CRE colonization cases is crucial to provide strong data support for hospital infection prevention and control in the later stage.

METHODS

Participant or population A total of 6 domestic studies and 10 foreign studies were included, with a sample size ranging from 8 to 840 cases and a total sample size of 2151 cases. Among them, 14 of the study subjects were colonized with CRE strains, with a total of 1906 cases. Only 2 of the study subjects were CRKP [11,17], with a total of

245 cases. The research was published from 2012 to 2022 and came from the United States [12,18], Italy [11,19], India [20], Greece [17], China [14,21-25], Thailand [8,26], Brazil [27], and Israel [15]. Please refer to Table 1 for details. All literature was rated according to the AHRQ standard, with 2 articles rated 10 points, 3 articles rated 9 points, 9 articles rated 8 points, and 2 articles rated 7 points, indicating that the overall quality of the included literature is relatively high.

Intervention Not Applicable.

Comparator Not Applicable.

Study designs to be included Apply Metaprop program in Stata 17.0 software for rate META merging and grouping analysis. The combined statistics are the incidence rate of traditional Chinese medicine (TCM) hospital infection in CRE colonization cases, which is the number of CRE hospital infection cases/total number of CRE colonization cases and their 95% confidence interval (CI), and a META analysis forest map is drawn; At the same time, the incidence of CRE bloodstream infection, 30-day mortality rate of CRE colonization cases, and 30-day mortality rate of CRE colonization infection cases were merged with META.

Eligibility criteria Inclusion criteria: ① Chinese and English published studies on the incidence of hospital infection in active screening of CRE colonization cases both domestically and internationally; ② Conduct active screening of intestinal specimens and identify the occurrence of hospital acquired infections in CRE colonization cases; ③ The age of the included subjects in the study is ≥ 18 years old; ④ Outcome indicators include the number of CRE colonization cases, the number of CRE hospital infection cases, or the incidence of hospital infection can be indirectly calculated based on the provided data; ⑤ Repeated publication of the same data or research covering th.

Information sources Computer search databases such as Embase, Cochrane, Pubmed, Web of Science, CNKI, Wanfang, VIP, and China Biomedical Literature Database (CBM) were established until June 2023 for public publication of literature. The search method used a combination of free words and subject words, without searching for gray literature or restricting language usage. The Chinese search terms include: "Active screening, carbapenems resistance, carbapenems resistance, Enterobacteriaceae resistance, colonization", while the English search terms include: "Active screening, active surveillance, carbapenems resistance, carbapenem, dry resistance, Enterobacteriaceae, colonization". A secondary search was conducted to identify studies that may meet the inclusion criteria.

Main outcome(s) A total of 16 articles, 5 Chinese articles, and 11 English articles were included, with a total sample size of 2151 cases. The meta-analysis results showed that the incidence of hospital infection in adult intestinal CRE colonization cases was 23.1% (95% CI: 14.8% 32.5%). Subgroup analysis was conducted based on grouping factors, such as different research design types, publication years, research survey years, survey countries, survey regions, survey departments, colonization bacteria types, and survey infection sites. The differences in the combined effects between subgroups were not statistically significant (P>0.05). The proportion of CRKP infection of CRE colonization cases was 96.0% (95% CI: 86.8%-100.0%), and the incidence of bloodstream infection was 18.2% (95% CI: 10.3%-27.6%). The 30-day mortality rate of CRE colonization cases is 32.6% (95% CI: 20.5%-45.9%), and the 30-day mortality rate of CRE infection cases is 36.9% (95% CI: 16.0%-60.2%).

Quality assessment / Risk of bias analysis The quality evaluation was conducted using the evaluation criteria recommended by the Agency for Healthcare Research and Quality (AHRQ) of the United States. The scale consists of 11 evaluation items, each of which was answered with "yes (1 point)," "no (0 point)," and "unclear (0 point)." The total score was 8-11 points, 4-7 points, and 0-3 points, respectively, representing high-quality, medium, and low-quality literature. Using Egger's test to determine whether there is potential publication bias.

Strategy of data synthesis Apply Metaprop program in Stata 17.0 software for rate META merging and grouping analysis. The combined statistics are the incidence rate of traditional Chinese medicine (TCM) hospital infection in CRE colonization cases, which is the number of CRE hospital infection cases/total number of CRE colonization cases and their 95% confidence interval (CI), and a META analysis forest map is drawn; At the same time, the incidence of CRE bloodstream infection, 30-day mortality rate of CRE colonization cases, and 30-day mortality rate of CRE colonization infection cases were merged with META. The heterogeneity between different

studies is represented by I 2, where I 2>50% indicates significant heterogeneity between studies, and a random effects model is used for analysis; On the contrary, a fixed effects model is used for analysis.

Subgroup analysis Subgroup analysis includes research design type, publication year, survey area, survey department, and infection site. Comparing the P-values of heterogeneity between subgroups in the forest map of subgroup analysis to determine whether there is a difference in the amount of merging effects between subgroups. The differences in the combined effects between subgroups were not statistically significant (P>0.05).

Sensitivity analysis Sensitivity analysis is conducted using a one by one exclusion method, which involves removing the included studies one by one and merging the incidence of hospital infections in the remaining studies. The impact of a single study on the total combined effect is observed to evaluate the stability of the meta-analysis results. The results obtained in this study showed no significant difference between 26.7% (95% CI: 17.9% to 35.5%) and 23.1% (95% CI: 14.8% to 32.5%) of the total combined effect, indicating good stability and reliability of the resultsSensitivity analysis using literature by literature exclusion method.

Country(ies) involved China (Shanghai Tenth People's Hospital).

Keywords active screening; carbapenem; drug resistance; Enterobacteriaceae; colonization; hospital infection; Meta analysis.

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