

Meta analysis of the application effect of target monitoring in ICU hospital infection and its impact on infection rate

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Introduction. ICU is a key department for hospital infection monitoring and prevention and control. How to take effective measures to reduce the infection rate is the focus of research. In recent years, although targeted monitoring has been widely used in ICU hospital infections, the results are not there. This study mainly explores the application effect of targeted monitoring in ICU hospital infection and its impact on infection rate.

Methods. The application effect of target monitoring in ICU hospital infection in PubMed, Ovid, Embase, Web of Science (WOS), Cochrane Library, CNKI (CNKI), Wanfang and other databases and Relevant Chinese and English literature on the impact on the infection rate. The retrieval time is from the establishment of the library to June, 2024, and the research is meta-analyzed using RevMan5.3 software.

Results. 2,134 articles of literature were obtained by preliminary search, and 13 articles were finally included; a total of 12,788 patients were included, and 11 high-quality documents were included, with a score of ≥ 6 points; 2 articles were regarded as low quality; 4 of the 13 documents involved the application effect of targeted monitoring for ICU hospital infection. The results can be seen that Standard monitoring is effective in ICU infection, which can understand the possible influencing factors of patient infection and formulate corresponding measures to prevent it. All 13 documents involve the impact of targeted monitoring on the infection rate of ICU hospital, and the heterogeneity between different literatures is small. Using a fixed effect model analysis, the results can be seen that the target Sexual monitoring can reduce the infection rate of ICU.

Conclusion. Targeted monitoring has a good effect in ICU hospital infection. It can grasp the infection situation of ICU hospital in real time and help to formulate corresponding intervention measures, thus reducing the clinical infection rate. However, in view of the quantity and quality of the included literature, further research and discussion are needed.

Keywords. Targeted surveillance; ICU; nosocomial infection; application effect; infection rate; Meta-analysis

INTRODUCTION

As an important department of the hospital, ICU can provide rescue measures and continuous life support for critically ill cases [1]. Due to the critical condition of ICU admitted cases, often accompanied by many invasive operations, the diagnosis and treatment process is more complex, coupled with the long-term bed rest, the large number and unreasonable use of antibiotics in patients, the clinical infection rate is high [2]. Hospital infection is more harmful to patients, which not only extends the hospitalization time of patients and increases the hospitalization pneumonia, but also endangers the patients' life [3] in serious cases. Richards M J And other medical studies show that [4], 65% -70% of patients with nosocomial infection can be prevented through a series of prevention and control measures. As the focus of nosocomial infection prevention and control, targeted surveillance is an effective method to prevent and control nosocomial infection by carrying out targeted monitoring, regular analysis and feedback of relevant data and possible influencing factors [5]. At the same time, during the diagnosis and treatment of ICU patients, improve the inspection rate of pathogenic bacteria before the treatment of antibiotics, which is conducive to the rational use of antibiotics and improve the clinical diagnosis and treatment level [6]. Wu Rui et al. showed that [7], ICU nosocomial infection target monitoring, can accurately grasp the incidence of ICU nosocomial infection, further understand the possible risk factors, and reduce the use of invasive operations as far as possible, so as to reduce the hospital infection rate. This study mainly investigated the effectiveness of targeted surveillance in ICU nosocomial infection

and its effect on infection rate, reported below.

1 LITERATURE SCREENING

1.1 Study design

The databases of PubMed, Ovid, Embase, Web of Science (WOS), Cochrane Library, CNKI of China (CNKI), and Wanfang were searched for the application effect of targeted surveillance in ICU hospital infection and the effect of its influence on infection rate. The search time is from database construction to June, 2024, and there is no limit on blinding and allocation scheme.

1.2 Literature inclusion and exclusion criteria

1.2.1 Inclusion criteria

(1) Study type: Search the RCT of Chinese and English databases on the application effect of targeted surveillance in ICU hospital infection and the impact on infection rate. (2) Study subjects: all the included cases were patients admitted to the ICU of the hospital, male and female, and those with severe consciousness disorders, depression and severe attenuation of organ function were excluded; (3) intervention measures. The control group adopted conventional intervention, and the observation group combined targeted monitoring intervention, including: patient basic information, hospital infection (including hospital infection incidence, daily incidence, adjusted daily incidence; device use, such as: device-related infection incidence; hospital infection site and pathogen distribution, etc.), ICU patient log, etc. (4) Outcome measures. Primary outcomes include: extractable main variables such as number of infections, total length of stay, duration of invasive device use and mean severity of illness; secondary outcomes include infection rate, distribution of infection site and pathogen distribution [8].

1.2.2 Exclusion criteria

(1) repeated publication of literature, case reports or observational studies; (2) guidelines, expert lecture forums, meeting minutes, news, evidence summary and case reports; (3) difficult to extract relevant data, difficult to obtain complete data in the literature; (4) similar articles published by the same author on different platforms or

difficult to extract one of the main outcome indicators of the study; (5) review, review articles and conference papers; (6) non-comprehensive ICU or non-target monitoring, monitoring period <6 months or unspecified monitoring methods and diagnostic criteria.

1.3 Methods

1.3.1 Search strategy

Search of Chinese and English database, Chinese search terms: target monitoring; ICU; hospital infection; application effect; infection rate; English search terms: Target monitoring; ICU; Hospital infection; Application effect; Infection rate; search time from database construction to June 2024, the obtained keywords using Boolean search logic and (AND), logic or (OR) to search [9].

1.3.2 Other search methods

After searching the different databases, they can be searched again manually and used as a supplement to the computer search. When manual search, enter the first author, title or keyword, and enter them into baidu Academic and Baidu Library to further determine the database type included in the article, complete the database search, and download the literature abstract or full text as far as possible. For those who are more difficult in obtaining literature, they can seek help through the "literature mutual assistance" platform, obtain the full text of the paper, and distinguish and identify the existence of potential research [10].

1.3.3, Chinese retrieval form

The retrieval type is targeted monitoring * ICU * hospital infection * application effect * infection rate

1 Keywords: ICU admitted cases / all trees / all sub-keywords

2 Targeted monitoring * ICU * nosocomial infection * application effect

3 Analyze the application effect of target monitoring in ICU hospital infection, find out the problems in the process of hospital infection intervention in time, and implement preventive measures as soon as possible

4 Targeted surveillance * ICU * nosocomial infection * infection rate

5 # 1OR # 2OR # 3

6 Keywords: influence / all trees / all subsubject words

7 Determine the effectiveness of targeted monitoring in reducing ICU hospital rates

8 # 1OR # 2OR # 3OR # 4OR # 5OR # 6OR # 7OR

1.3.4 English search form

The retrieval method was used to monitor *ICU* hospital infection * application effect * infection rate

1 Headings: ICU cases/all trees/all sub-headings

2 Effectiveness of targeted surveillance *ICU* nosocomial infection *

3 Analyze the application effect of targeted monitoring in ICU nosocomial infection, timely discover the problems existing in the intervention process of nosocomial infection, and implement preventive measures as soon as possible

4 Target monitoring *ICU* nosocomial infection * infection rate

5 # 1OR # 2OR # 3

6 Headings: Affect/All Trees/All subheadings

7 Determine the role of targeted surveillance in reducing ICU hospital rates

8 # 1OR # 2OR # 3OR # 4OR # 5OR # 6OR # 7OR

1.4 Study selection and data extraction

According to the inclusion and exclusion criteria, the screening of relevant literature is completed independently, and the pre-designed data extraction table is used to complete the extraction of relevant data. Cross-check shall ensure the accuracy and scientificity of the data, and if there are any disputes, it can be determined through negotiation. The extract include: first author, magazine, number of cases, years, program and outcome indicators. For the determination of infection cases, the site of infection and the pathogen distribution were further defined. Contact the corresponding author when necessary to obtain more data on the literature, exclude studies that are difficult to obtain more information, and indicate [11] in the results.

1.5 Literature quality evaluation

The resulting literature was evaluated using the Newcastle-Ottawa Scale (NOS) with a total score of 9: subject selection (4 points), comparability (2 points), measurement of exposure factors (3 points); the cohort study included subject selection (2 points) and outcome strategy (3 points), with scores > 6 indicating high quality literature [12].

1.6 Statistical methods

Meta-analysis of the data was performed using the RevMan5.3 software. For heterogeneity test by Q test and I² statistic, for $P > 0.1$ and $I^2 < 50.0\%$, the effect values with $P < 0.05$.

2 Results

2.1 Literature search

In preliminary search, 2134 documents were obtained, which were imported into EndNote software. 693 duplicate documents were automatically eliminated; the remaining 1441 literature reader titles and abstracts, and realized real-time annotation and dynamic deletion; 399 articles were downloaded and read, and 13 articles were included, see Figure 1.

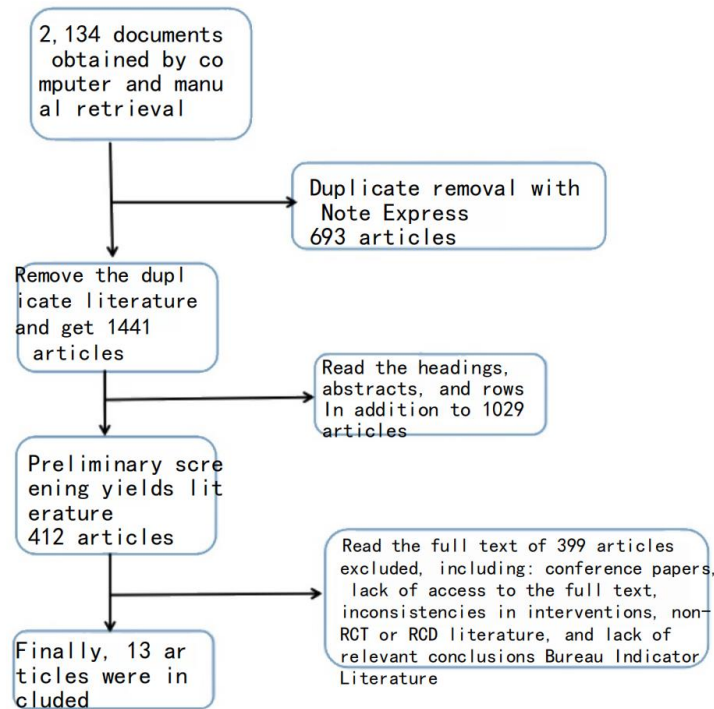


Figure 1. Schematic representation of the literature search

2.2 Literature data extraction and quality evaluation

The basic characteristics of the literature are shown in Table 1. A total of 12788 patients were included and completed the quality evaluation of the included literature through the NOS scale, including 11 high quality articles with both 6 points; 2 articles scored 5 points as low quality, as shown in Table 1 and Table 2.

Table 1 Extraction of the literature data

Author	Periodical office	Example number	Age limit	Plan	Outcome indicators
Zhang Lei	The Chinese Journal of Disinfection	5963	2023	The control group was managed by conventional methods, and the observation group was combined with targeted monitoring	Target monitoring effect and infection rate
Zhou Haiping	The Chinese Journal of Disinfection	152	2024	The control group adopts the conventional method of intervention, and the joint cluster management scheme under the target monitoring of the observation group	Intervention effect and infection rate
Richards M J	Critical Care Medicine	562	1999	The control group was managed by conventional methods, and the observation group was combined with targeted monitoring	Infection rate, site of infection, and pathogen distribution
Shen Yan	Journal of Nursing Management	496	2010	Group by time points, conventional method intervention before implementation, and post-implementation combined target monitoring	Hospital infection rate, clear site of infection
Yi-Hong J	Chinese Journal of Nosocomiology	432	2012	The control group was managed by conventional methods, and the observation group was combined with targeted monitoring	Monitoring effect, infection rate, and pathogen

					distribution
Wu Rui	Chinese Journal of Hospital Infectology	1301	2017	The control group was managed by conventional methods, the observation group combined target monitoring, and analyzed possible influencing factors	Infection rate, and identify the possible factors affecting the infection
Li Meng	Nursing practice and research	1126	2020	Early precautions was used in the control group and targeted monitoring in the observation group	Monitoring effect and infection rate
Zhou Ping	Chinese Traditional Chinese Medicine emergency	418	2010	Early precautions was used in the control group and targeted monitoring in the observation group	Intervention effect, infection rate, and clarify the cause of infection
Yan Lijuan	Clinical medicine practice	512	2008	The control group used the conventional method of intervention, and the observation group combined with the targeted monitoring intervention	Intervention effect and infection rate
Jun-hua Yang	Journal of Chengdu Medical College	432	2012	The control group used conventional intervention, and the observation group combined targeted monitoring and real-time intervention	ICU hospital infection and the detection rate of drug-resistant bacteria
Xu Qinfen	China Medical Herald	652	2016	A targeted monitoring intervention was used, and the influencing factors were analyzed	Analysis of infection rate and influencing

					factors
				The control group used	
Li Jian	Guangxi medicine	372	2014	conventional intervention, and the observation group combined with targeted monitoring and dynamic intervention	Intervention effect and infection rate
Li Yanping	Medical clinical research	370	2015	A targeted monitoring intervention was used, and the influencing factors were analyzed	Analysis of infection rate and influencing factors

Table 2. Evaluation of the literature quality

Author	Study subject selection	Comparability between groups	The outcome measure	Score
Zhang Lei	2	2	2	6
Zhou Haiping	2	1	2	5
Richards M J	3	2	2	7
Shen Yan	2	3	2	7
Yi-Hong J	2	2	1	5
Wu Rui	2	3	2	7
Li Meng	3	2	2	7
Zhou Ping	2	3	3	8
Yan Lijuan	3	2	3	8
Yang Junhua	3	3	1	7
Xu Qinfen	3	3	2	8
Li Jian	2	3	3	8
Li Yanping	3	2	3	8

2.3 Meta-analysis of the application effect of targeted monitoring in ICU hospital infection

Four of 13 articles involve the application effect of target monitoring in ICU hospital infection, with little heterogeneity between different documents; using fixed effect model analysis, the results show that target monitoring has good effect in ICU infection, can understand the possible influencing factors of patient infection, and formulate corresponding prevention measures, see Figure 2.

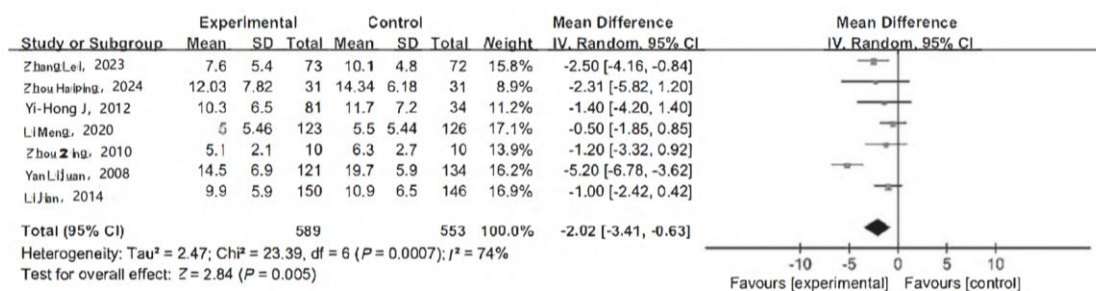


Figure 2 A meta-analysis of the effectiveness of targeted surveillance in ICU hospital infection

2.4 A meta-analysis of the effect of targeted surveillance on ICU hospital infection rate

13 articles concerned the effect of targeted surveillance on ICU hospital infection rate, and little heterogeneity between different documents; fixed effect model analysis showed that targeted surveillance can reduce ICU infection rate, see Figure 3.

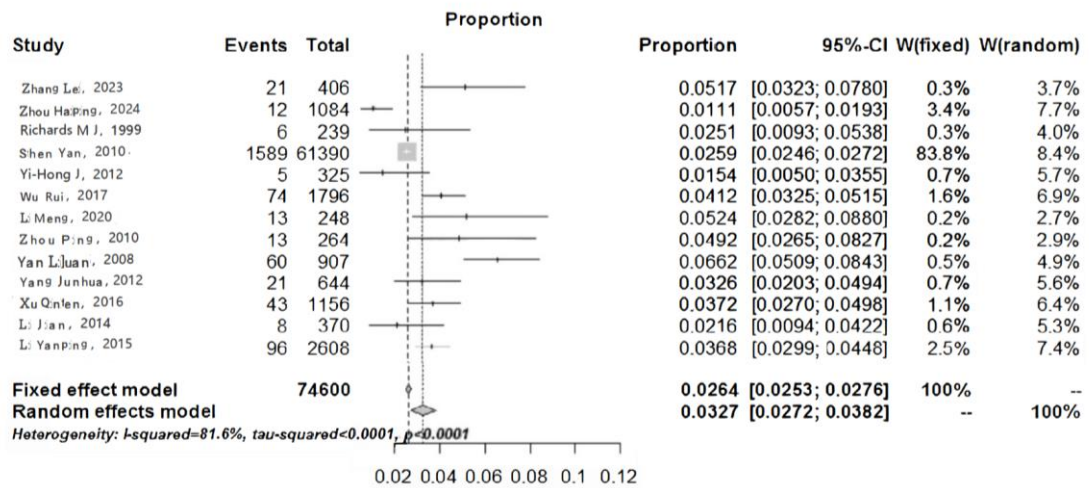


Figure 3 A meta-analysis of the effect of targeted surveillance on ICU hospital infection rate

3 DISCUSSION

As an important department of the hospital, ICU treats patients with relatively serious condition, the condition of patients with relatively serious condition, and many basic diseases, coupled with the low immune level of patients, frequent invasive operations and the widespread use of antibiotics, leading to the high nosocomial infection rate of ICU patients [13-14]. Xu Qinfen et al showed that [15], nosocomial infection occupies a relatively high proportion in ICU, and it is more harmful to patients, which has become an important cause of death of patients. In this study, 2134 articles were obtained by preliminary search and 13 articles were included; 12788 patients; 11 high quality articles with 6 scores; 2 articles were considered as low quality; 4 of 13 articles involved the application effect of targeted surveillance in ICU hospital infection. The results showed that targeted surveillance had good effect in ICU infection, can understand possible influencing factors of patient infection, and formulate preventive measures. Analysis of reasons: targeted surveillance is the focus of nosocomial infection prevention and control work [16]. Through targeted monitoring, regular analysis and feedback of relevant testing data, the possible influencing factors of patient infection can be determined, and corresponding

measures can be taken to help prevent and control nosocomial infection [17]. At the same time, the use of targeted monitoring can improve the detection rate of pathogenic bacteria before antimicrobial treatment, so as to improve the use of antibacterial drugs, so as to improve the level of medical diagnosis and treatment [18].

Patients admitted to ICU have relatively serious conditions, poor general condition, long-term bed, etc. In severe cases, patients often experience coma, hypothermia anesthesia or surgery, resulting in a high utilization rate of invasive operations such as indwelling urinary catheter and gastric tube, making patients more prone to nosocomial infection [19]. In this study, 13 articles involved the influence of targeted surveillance on ICU hospital infection rate, and little heterogeneity between different documents; using fixed-effect model analysis, the results show that targeted surveillance can reduce ICU infection rate, which shows that targeted surveillance can reduce ICU hospital infection rate, and most patients can benefit from it. Analyzing reasons: Target monitoring can make up for the temporary and unsustainable improvement effect caused by the single mode infection prevention and control promotion strategy, and the intervention measures based on target monitoring can effectively promote the monitoring and feedback, reminder and communication and safety measures, establish the prevention and control mechanism through risk assessment and systematic analysis, jointly monitor and summarize the problems in the strategy and feedback, and achieve good prevention effect. Liu Shasha et al. showed that [20], targeted monitoring in ICU hospitals, can prevent surgical site infection, improve hand hygiene compliance, control the spread of carbapenem-resistant bacteria, and can achieve good prevention and control effects. The more important significance of targeted monitoring is that the measure can follow the principle of continuous quality, constantly find deficiencies in the process of targeted monitoring, and form prevention and control measures suitable for hospitals, and different hospitals reach a consensus to reduce the mortality rate of patients.

In conclusion, targeted monitoring has good results in ICU hospital infection, and can grasp the ICU hospital infection situation in real time, and help to develop

corresponding interventions, so as to reduce the clinical infection rate. However, given the quantity and quality of the included literature, further research and discussion are needed.

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