

Investigation of the Study and Application of Sepsis Guidelines by Physicians in Tertiary Hospitals in China

Silu Han

Beijing Chao-Yang Hospital

Lijian Cui

Beijing Chao-Yang Hospital

Yifan Qu

Beijing Chao-Yang Hospital

Tian Tian

Beijing Chao-Yang Hospital

Bing Wei

Beijing Chao-Yang Hospital

Junyu Wang

Beijing Chao-Yang Hospital

Jun Yang (✉ yangjun26@sina.com)

Beijing Chao-Yang Hospital

Research Article

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Abstract

Background: To investigate the current status and problems of sepsis guidelines in clinical application among doctors in tertiary hospitals in China and to provide evidence-based case for the formulation, implementation, and training on sepsis diagnosis and treatment.

Methods: Physicians from tertiary hospitals, mainly in emergency and critical care departments were enrolled into the survey. Participants completed a questionnaire on sepsis score, diagnostic indicators, fluid resuscitation, antibiotics choice, access to knowledge and application training, and the application of sepsis guidelines in clinical diagnosis and treatment.

Results: Of 661 questionnaires that were distributed, 625 were returned. A total of 432 (69.12%) respondents had junior and intermediate professional titles and 193 (30.88%) had senior titles. Among them, 291 (46.56%) were self-taught, 148 (23.68%) were attending lectures, 153 (24.48%) were assigned ward rounds by senior doctors, 9 (30.88%) were taught in other ways, and 24 (3.84%) had no training. To learn about sepsis guidelines, 36.64% of respondents preferred attending lectures, 34.72% chose to study by themselves, and 27.04% preferred listening to senior doctors. Regarding the best way to learn about sepsis guidelines, 42.08% preferred to read by themselves, 41.76% preferred attending lectures, and 14.72% preferred listening to senior doctors. For formulation and implementation of sepsis diagnosis and treatment strategy, >90% of the respondents thought that they needed to rapidly give patients large volumes of fluid replacement but were not satisfied, while 89.6% doctors agreed that rehydration should follow the principle of “use with vasoactive drugs, not too much”. Of the respondents, 61.92% preferred empirical drugs in the use of sepsis antibiotics, 34.56% preferred high-level antibiotics with a wide coverage strategy, 2.4% would choose following instructions by senior doctors, and 0.16% did not know how to choose. Over 70% of the doctors surveyed thought that self-study guide, attending lectures, and senior doctors’ ward rounds were the most important factors affecting drug use, while 47.68% said that the information found on the internet was an important way of guiding drug use.

Conclusion: Although the prevalence of sepsis guidelines is high among doctors in tertiary Chinese hospitals, homogeneity of clinical application is poor and greatly affects diagnosis and treatment. Thus, standardized training for sepsis diagnosis and treatment is needed.

1.0. Background

Sepsis is a major focus of emergency treatment due to its high mortality risk [1]. The 2016 joint release by the SCCM (American Society for Critical Care Medicine) and ESICM (European Society for Critical Care Medicine) on the definition and diagnostic criteria of sepsis 3.0, define sepsis as a life-threatening organ dysfunction caused by an unbalanced response to infection. Prevention, early detection and treatment of sepsis are key to improving patient survival [2]. In the guidelines, it is emphasized that the diagnosis and treatment of sepsis should be standardized so as to improve prognosis. However, there are numerous challenges in the practical application of sepsis 3.0. In 2010, a foreign study on the identification of

sepsis among emergency department nurses found that initially, only 18% of people knew the exact standard of sepsis, and 80% did not know the blood pressure level for septic shock. After 12 weeks of follow-up, 75% of the people knew the diagnostic criteria for sepsis, and their awareness of the blood pressure of patients in septic shock increased to 100% [3]. Thus, it is crucial to strengthen the training of emergency and critical care personnel on sepsis. However, that study involved only the identification of sepsis by nursing staff in emergency departments abroad. There are no similar studies in China, and it has not been reported abroad. Here, we designed a questionnaire to investigate the understanding and application of sepsis guidelines by doctors in Chinese tertiary hospitals. We identified the reasons for the poor homogeneity in sepsis diagnosis and treatment and recommended guidelines for evidence-based standardization of clinical sepsis diagnosis and treatment.

2.0. materials And Methods

2.1. Participants

Doctors from 126 tertiary hospitals in 26 provinces and municipalities (except Xin jiang, Tibet, Taiwan, etc.) in China were investigated and majority of them worked in the emergency (88.32%) and critical care (10.88%) departments.

2.2. Methods

The survey was conducted through the questionnaire star platform. All the respondents were doctors from tertiary hospitals, mainly in emergency and critical care. The contents and evaluation criteria of the questionnaire were discussed and formulated by experts in acute infection and included sepsis score, diagnostic indicators, fluid resuscitation strategy, antibiotic selection, and acquisition of relevant treatment knowledge, and application of training. The survey has been approved by hospital-level ethics and agreed by all participants.

2.3. Effect evaluation

All respondents completed the questionnaire, whether it is a single item or multiple choices, and reached different conclusions on the study of sepsis guidelines and clinical practice.

3.0. Statistical Methods

Graphpad prism (version 5.0) was used for statistical analyses. All data are expressed in percentage.

4. 0.results

Of the 661 questionnaires distributed, 625 questionnaires from 126 hospitals in 26 Chinese provinces and municipalities (except Xin jiang, Tibet, Taiwan, etc.) were returned. Of the participating doctors, 88.32% worked in the emergency department and 10.88% in the intensive care department. Among them,

69.12% had junior and intermediate professional titles, 30.88% had at least deputy senior professional titles. 95.36% were teaching hospitals and 4.64% were non-teaching hospitals (Fig. 1).

In terms of how to acquire knowledge on sepsis guidelines, majority of the physicians received sepsis-related training. 46.56% of the respondents studied by themselves, 23.68% attended lectures, 24.48% learnt senior from doctors, and 1.44% studied in other ways. Only 3.84% did not receive training (Fig. 2).

For the effect of sepsis guidelines on clinical diagnosis and treatment, 36.64% of doctors felt that attending lectures was effective, 34.72% felt self-study was effective, 27.04% felt ward rounds with senior doctors was effective (Fig. 3).

In terms of learning effect, the doctors surveyed thought that reading the guidelines and attending lectures was best for learning (42.08% vs 41.76%), followed by senior doctors' ward rounds (14.72%, Fig. 4).

With regards to single treatment strategy, > 90% of the surveyed doctors thought that graph learning was more effective. Treating septic shock patients first requires rapid and massive fluid replacement, followed by high doses of vasoactive drugs and human serum albumin supplementation. However, most doctors are not satisfied and consider that fluid replacement in sepsis should follow the principle of "use with vasoactive drugs, not too much" (Figs. 5–6)

More than half of the doctors (61.92%) chose to use antibiotics empirically, which was adjusted based on the clinical situation. 34.56% of the doctors thought that the use of advanced antibiotics in patients with sepsis should be widely covered immediately. 2.40% of the medical students chose to listen to senior doctors, and 0.16% did not choose (Fig. 7). Further investigation on the basis of antibiotic use found that self-study guide, attending lectures and studying, and senior doctors' ward rounds were the most important factors (> 70%). It should be noted that 47.68% of doctors relied on internet searches for drug use guidance (Fig. 8).

5.0. Discussion

Sepsis guidelines have been published for a long time, but challenges remain in clinical application. The main problem is that the clinical diagnosis and treatment cannot be done with strict adherence to guidelines. In this study, we found that among doctors in tertiary Chinese hospitals, attending lectures, self-study guides, and ward rounds by senior doctors are considered the most effective learning methods and can quickly influence clinical diagnosis and treatment. However, nearly half of the doctors choose self-study guide to acquire relevant knowledge on sepsis and the proportion is significantly higher than that of those using other methods. However, clinicians are more willing to attend lectures and recognize the effect of this learning method. The reason being that medicine is an empirical subject based on theoretical knowledge and most of the teachers are doctors with rich clinical experience. Therefore, although there are some conflicts with guidelines, treatment methods in line with China's national condition are easier to follow for Chinese doctors. It should be noted that the impact of senior doctor's

ward round teaching, especially to junior doctors, is significantly lower than we expected, indicating that compared to attending lectures, superior doctor's guidance is not enough, or does not induce the participants to think and discuss problems. This has a negative impact on clinical diagnosis and treatment.

Fluid resuscitation is an important part of sepsis management [4]. In this survey, > 90% of the doctors believed that rapid and large-scale fluid replacement was needed, followed by administration of high-dose vasoactive drugs and human serum albumin supplements. However, when talking about the principle of fluid replacement in sepsis, most of the doctors thought that it should be used with vasoactive drugs, and that the amount of fluid replacement should not be too high. This kind of contradictory conclusion reflects that there is a certain deviation in our understanding of the guidelines on clinical diagnosis and treatment, which is also obviously reflected in the use of antibiotics. In our study, we found that more than half of the doctors who participated in the survey chose the empirical antibiotic use strategy first, and then adjusted based on clinical outcomes. Nearly 1/3 chose the empirical antibiotic use. According to the investigation on the basis of drug use plan, most doctors think that their choice of antibiotic treatment plan comes from studying guidelines. The reason for confusion in the diagnosis and treatment process is that we lack standardized training, which leads to unclear concepts and biased interpretation of treatment strategies. This needs urgent correction [5, 6].

How should standardized training on sepsis be done? Through investigation and analysis, we found that although the proportion of doctors practicing self-study is higher, they are actually more willing to accept lectures and training. This is because experienced senior doctors can explain the guidelines during clinical practice, analyze patient condition in clinical settings, interpret guidelines in detail, and ensure the safety of each participant during diagnosis and treatment with the doctors participating. This is more conducive for accumulation of clinical experience by junior doctors and provides better "closed-loop learning" [7]. However, at this stage, our survey indicates that there are great omissions in ward rounds and explanations by senior doctors, which necessitates that young doctors learn by themselves or go out to learn in order to obtain more knowledge. Consequently, variations in knowledge and skills cognition and mastery is inevitable. Therefore, to realize standardized training on sepsis, we should first improve the quality of our clinical rounds and then adopt targeted training methods like special lectures, case sharing, online exchange learning, and organizing sepsis related knowledge competitions, to improve the quality and effectiveness of training.

Additionally, training may be improved by optimizing content, for example, by using charts, tables, and other intuitive teaching methods, and minimizing text content in order to facilitate memory. A foreign survey of emergency department nurses found that training employees through pocket cards, posters, and electronic accessible guides can improve their recognition of sepsis [3].

For training effect, we should pay attention to follow-up, clinical application of training guidelines, and fully compare prognosis and symptom improvement time of patients treated according to clinical experience and standardized guidelines. In addition to emergency physicians, the number of physicians

in respiratory and critical care departments should be increased. If the situation permits, we can compare differences between emergency physicians and respiratory critical care physicians in the process of sepsis diagnosis and treatment so as to carry out targeted training [8].

Onsite training (i.e., education in actual clinical setting) can enhance learning. With the popularity of simulation centers and computerized laboratories, core technologies play an increasingly important role in teaching clinical skills [9], such as setting up virtual online patients, allowing students to give diagnosis and treatment plans according to described cases. This method can help educators identify knowledge gaps in sepsis management students and focus on weak links. We can strengthen the curriculum to cultivate students' ability to identify and treat sepsis, and then improve safety and treatment effectiveness [10]. Currently, online learning is especially suitable and critical in the fight against the COVID-19(Corona Virus Disease 2019) pandemic [11].

6.0. Conclusion

The investigation found that the clinical practice of sepsis management is inconsistent with sepsis guidelines, which was reflected in the fluid resuscitation and the choice of antibiotics in septic shock. Therefore, Chinese physicians need to establish standardized training and a scientific guidance team for sepsis.

Abbreviations

SCCM: American Society for Critical Care Medicine

ESICM:European Society for Critical Care Medicine

COVID-19☒Corona Virus Disease 2019

Declarations

7.2.Ethics approval and consent to participate

We have a Chinese ethics approval document for this research, Please check the supplementary file.

All methods are implemented in accordance with relevant guidelines and regulations.

This study obtained verbal consent from all participants instead of written consent, because it was requested to avoid gatherings during the period of COVID-19, and the ethics committee of Beijing Chao-Yang Hospital approved this procedure.

7.3.Consent for publication

Not applicable

7.4.Availability of data and material

All data and material underlying this study are included in this paper.

7.5.Competing interests

The authors declare no conflict of interest.

7.6.Funding

Beijing Municipal Administration of Hospitals Incubating Program Code:

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This fund runs through research design, collection, analysis and manuscript writing.

7.7.Authors' contributions

JY JYW and BW design this questionnaire

SLH LJC YFQ TT data collation

SLH data analysis and write original draft

JY JYW edit manuscript

JYW funding.

All authors read and approved the final manuscript.

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Figures

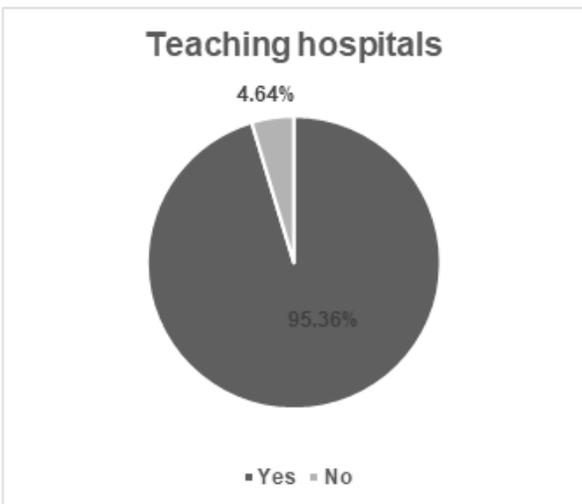
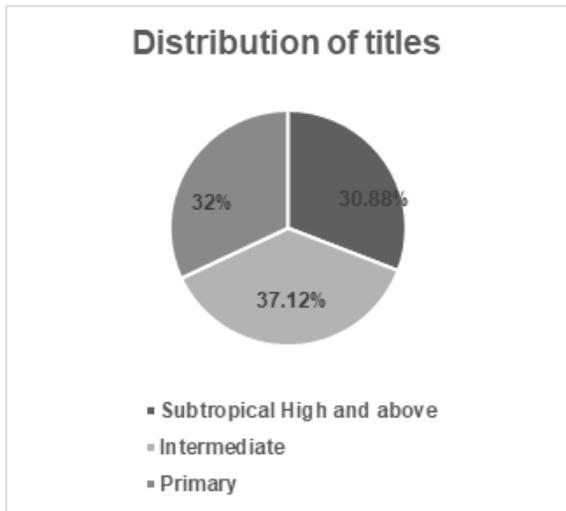
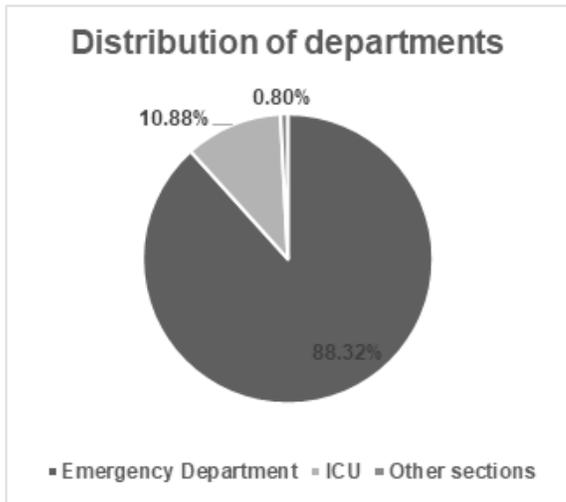


Figure 1

basic information on interviewees In terms of how to acquire knowledge on sepsis guidelines, majority of the physicians received sepsis-related training. 46.56% of the respondents studied by themselves, 23.68% attended lectures, 24.48% learnt senior from doctors, and 1.44% studied in other ways. Only 3.84% did not receive training (Figure 2).

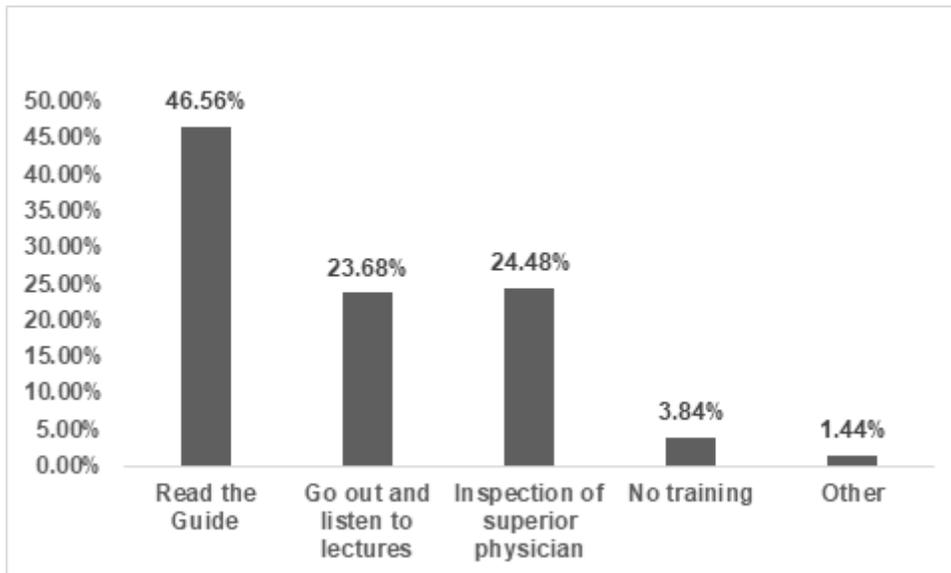


Figure 2

knowledge acquisition For the effect of sepsis guidelines on clinical diagnosis and treatment, 36.64% of doctors felt that attending lectures was effective, 34.72% felt self-study was effective, 27.04% felt ward rounds with senior doctors was effective (Figure 3).

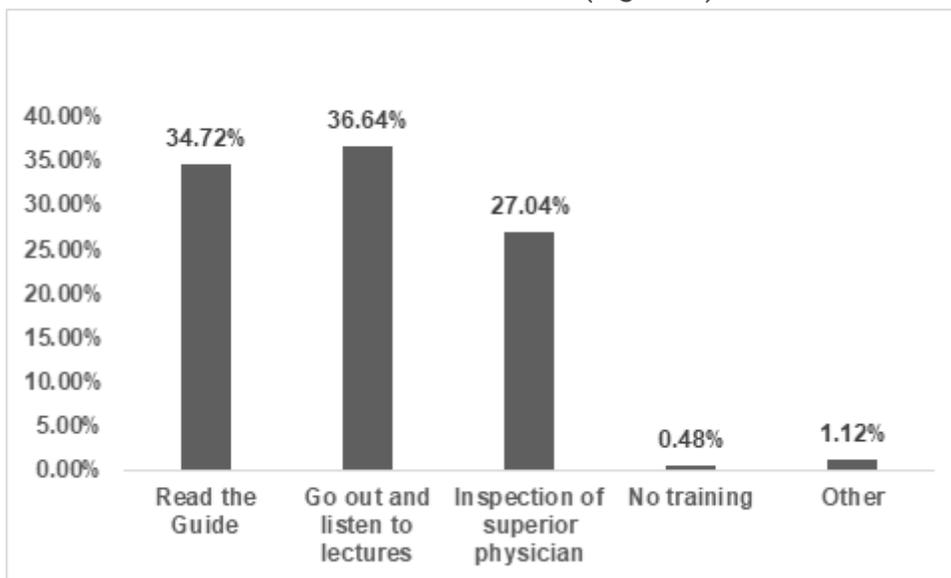


Figure 3

Impact on diagnosis and treatment In terms of learning effect, the doctors surveyed thought that reading the guidelines and attending lectures was best for learning (42.08% vs 41.76%), followed by senior doctors' ward rounds (14.72%, Figure 4).

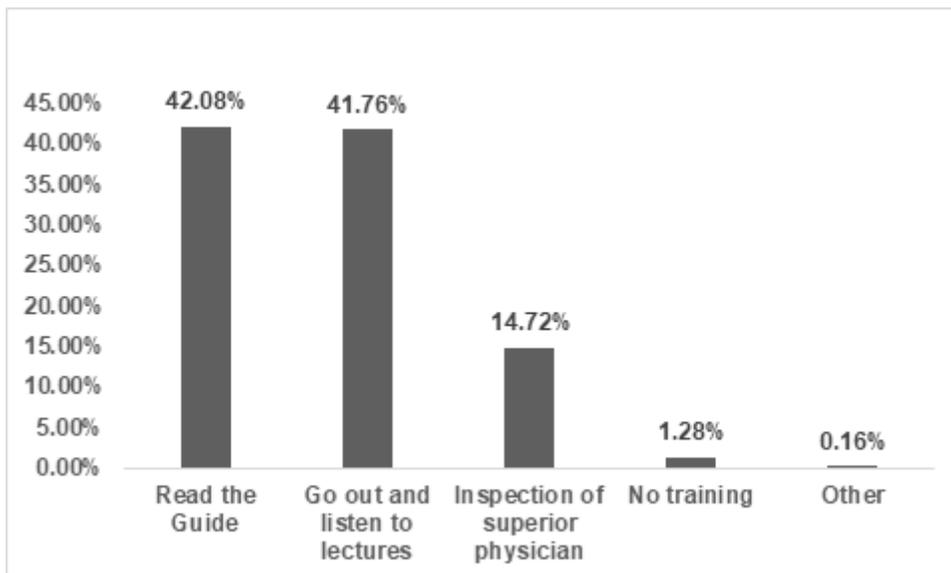


Figure 4

Learning effect With regards to single treatment strategy, >90% of the surveyed doctors thought that graph learning was more effective. Treating septic shock patients first requires rapid and massive fluid replacement, followed by high doses of vasoactive drugs and human serum albumin supplementation. However, most doctors are not satisfied and consider that fluid replacement in sepsis should follow the principle of “use with vasoactive drugs, not too much” (Figures 5-6)

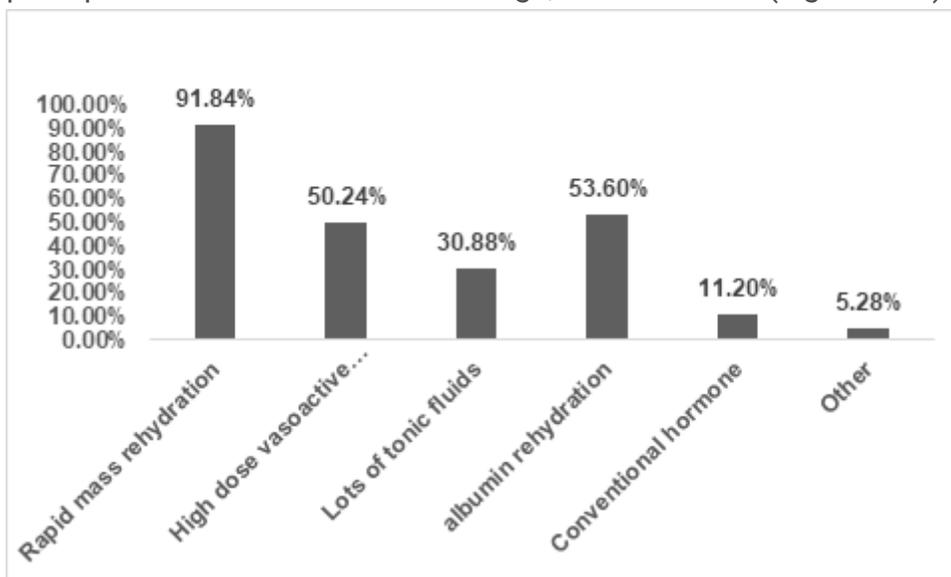


Figure 5

cognition of fluid resuscitation in patients with sepsis

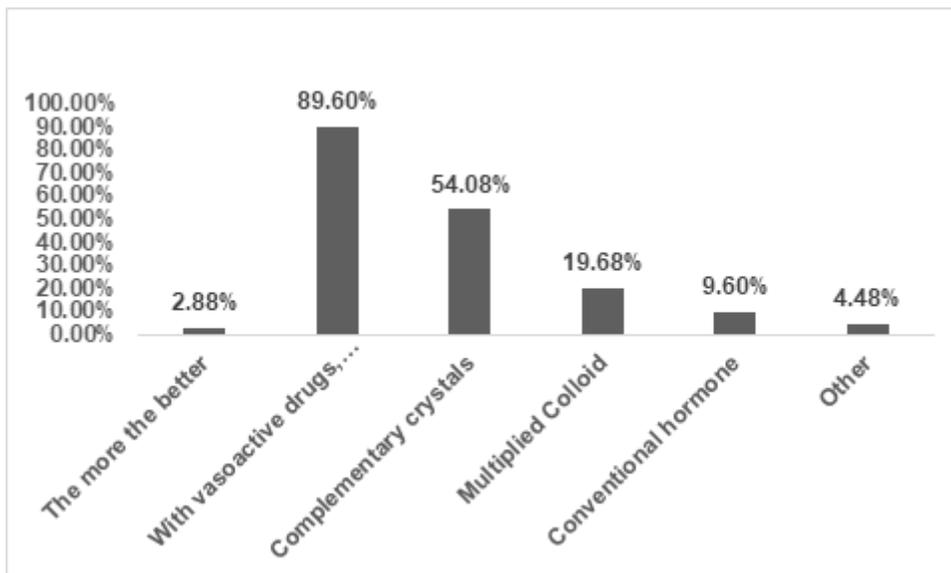


Figure 6

Sepsis rehydration principle cognition More than half of the doctors (61.92%) chose to use antibiotics empirically, which was adjusted based on the clinical situation. 34.56% of the doctors thought that the use of advanced antibiotics in patients with sepsis should be widely covered immediately. 2.40% of the medical students chose to listen to senior doctors, and 0.16% did not choose (Figure7). Further investigation on the basis of antibiotic use found that self-study guide, attending lectures and studying, and senior doctors' ward rounds were the most important factors (>70%). It should be noted that 47.68% of doctors relied on internet searches for drug use guidance (Figure 8).

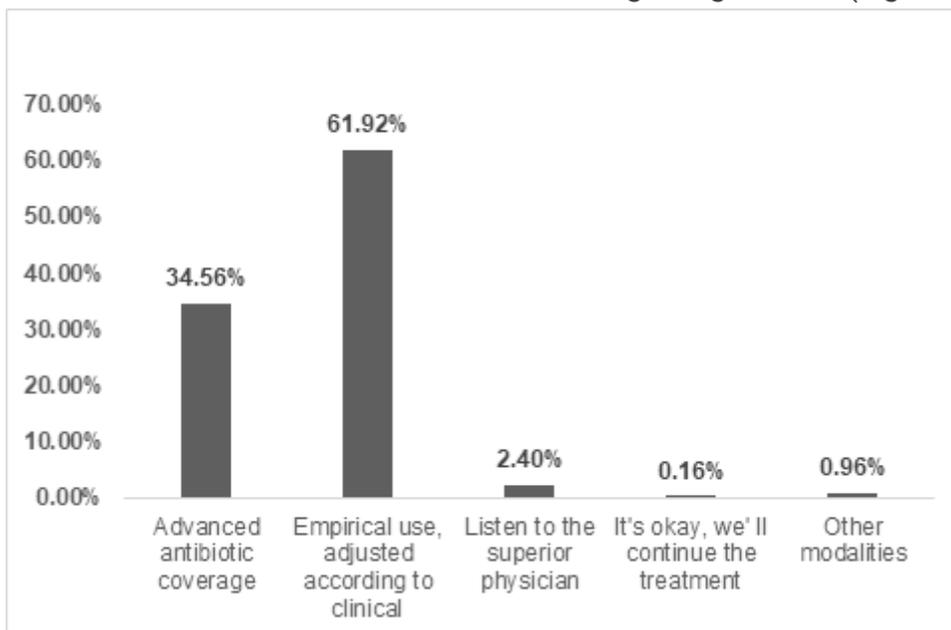


Figure 7

Antibiotics selection

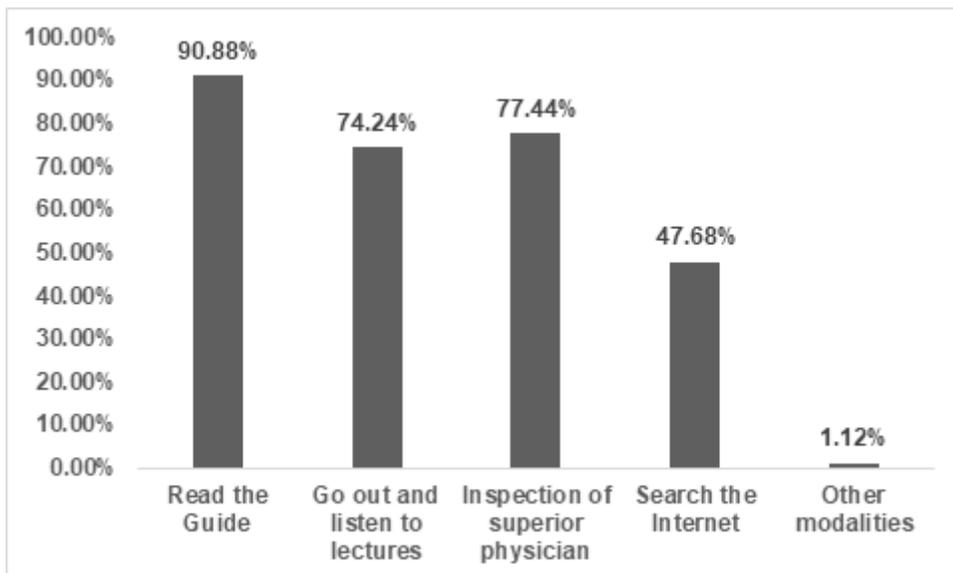


Figure 8

basis of antibiotic use selection