

# Effect of guideline education on the attitude toward issues in terms of adult community-acquired pneumonia and emphasis of future training programs: a nationwide survey for Chinese physicians in 2018

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*To the Editor:* Chinese Thoracic Society (CTS) updated the Chinese clinical practice guideline for community-acquired pneumonia (CAP) in adults in 2016,<sup>[1]</sup> and launched a series of guideline training programs around the nation in 2016 to 2017. To measure the achievements of guideline training programs and identify the problems of CAP management, we performed a national electronic questionnaire survey towards physicians in charge of the management of CAP between March and July 2018.

The training was led by the committee members of the Infection Assembly of the CTS and local society leaders. It was performed in the form of on-site seminars and webinars, and was comprised of eight sections and lasted four hours. The training materials were composed by the guideline writing committee and all the lecturers were trained to ensure that the standardized lectures were provided.

The questionnaire was composed of five sections, including personal and practice characteristics, diagnosis and assessment, pathogenic examination and antibiotic treatment, other treatments, and discharge and prevention. The draft was reviewed and approved by the expert group from the Infection Assembly of the CTS. The full text of the questionnaire has been published in our previous report about Chinese physicians' views of microbiological tests and availability of non-culture technique.<sup>[2]</sup> Our questionnaire was generated and distributed by the Quick Response code via Questionnaire Star platform (Changsha Haoxing Information Technology Co. Ltd., Changsha, Hunan, China).

As for recruitment of participants, we listed all the member hospitals of the Infection Assembly of the CTS and their local alliance hospitals, and enrolled all the qualified physicians in these hospitals who had treated patients with CAP. All the data were exported into files at xls or sav format via Questionnaire Star platform and analyzed by SPSS version 23.0 (IBM Corporation, Armonk, NY, USA). All the categorical variables were described as counts and percentages. Chi-square test or Fisher exact test was used to perform the univariate analysis. To validate the efficacy of guideline training in improving physicians' understandings, the following five variables were included into the multivariate logistic regression models: (1) receiving guideline training or not, (2) grade-A tertiary hospital or not, (3) teaching hospital or not, (4) pulmonologist or non-pulmonologists, (5) junior, middle or senior job title. Adjusted odds ratio and *P* values were calculated by the binary logistic regression analysis with backward stepwise selection.

A total of 6333 physicians around the nation filled out the questionnaire, and their detailed characteristics have been previously described.<sup>[2]</sup> In brief, participants from 32 provincial-level divisions of China were investigated, with about 2/3 working in the developed eastern region. The ages and job titles of these respondents were evenly distributed. Respondents were mainly from departments of respiratory medicine (4905/6333, 77.5%) and emergency departments (484/6333, 7.6%). Besides, 71.0% (4499/6333) of participants served in Grade-A Tertiary hospitals, 9.4% (593/6333) in Grade-B Tertiary hospitals, and

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**Table 1: Effects of guideline training on the physicians' understanding in the management of CAP.**

Items	Receiving guideline training, n (%)	Not receiving guideline training, n (%)	OR	95% CI	P value
Chest imaging in diagnosis	3771 (81.3)	1131 (66.8)	1.82	1.59–2.07	<0.001
CURB-65 for severity evaluation	3482 (75.0)	1076 (63.6)	1.57	1.39–1.78	<0.001
Atypical pathogens coverage for severe CAP	3107 (67.0)	955 (56.4)	1.39	1.23–1.56	<0.001

Odds ratios and *P* values were calculated after adjusting the following variables: grade-A tertiary hospital or not; teaching hospital or not; pulmonologist or non-pulmonologists; junior, middle or senior job title. CAP: community-acquired pneumonia; CURB-65: Confusion, urea, respiratory rate, blood pressure, age  $\geq 65$  years; OR: Odds ratio; CI: Confidence interval.

18.3% (1156/6333) in Secondary hospitals. Nearly 3/4 (4640/6333) of respondents participated in the guideline training programs of 2016 Chinese guideline of adult CAP in 2017.

Some satisfying achievements resulted from guideline training were observed, including the widely use of chest imaging for diagnosis, the high degree of acceptance of CURB-65 (confusion, urea, respiratory rate, blood pressure, age  $\geq 65$  years) score, in site-of-care decision and atypical pathogen coverage in empirical therapy for severe CAP [Table 1]. As for diagnosis, 4902 (77.4%) participants argued that chest image changes were essential for diagnosis of CAP, and receiving guideline training effectively increased the application of chest imaging in diagnosis of CAP [Table 1]. A majority of physicians preferred to use CURB-65 score (4558/6333, 72.0%) to assess the severity of CAP rather than use Pneumonia Severity Index (PSI;1285/6333, 20.3%) or CRB-65 (confusion, respiratory rate, blood pressure and age  $> 65$  years) score (490/6333, 7.7%), which was independently associated with the acceptance of guideline training [Table 1].

Furthermore, some misunderstandings were identified. For treatment, the evaluation of potential pathogens before administering the empirical therapy was ignored by 25%–35% of respondents (2148 for non-severe CAP and 1758 for severe CAP), and 35.9% (2271/6333) underused the antibiotics covering atypical pathogens for empirically treating patients with severe CAP. Excessive use of corticosteroids in the outpatient department was also observed. For prevention, nearly 75% of physicians (4624 for influenza vaccines and 4724 for pneumococcal vaccines) ignored the patient education of vaccination, regardless of their departments, regions or work experience.

For empirically treating patients with CAP, 57.3% (3631/6333) of participants thought that the drug availability still affected the standardized application of antibiotics in China to some extent. More than 40% (2869/6333) of participants administered antibiotics for over 7 days despite good response to initial treatment, which might lead to overtreatment. Besides, completely-absorbed pulmonary infiltrates on chest images were wrongly regarded as the indications of antibiotic discontinuation (3121/6333, 49.3%) and discharge (1623/6333, 25.6%).

Although steroids were not routinely recommended for treating CAP except for those with septic shock,<sup>[1]</sup> nearly 1/3

(1661/6333) of the physicians admitted that they had prescribed corticosteroids for more than half of patients they treated in the outpatient department. Only 1709 (27.0%) respondents routinely recommended influenza vaccines to patients at hospital discharge. Additionally, the recommendation rate of pneumococcal vaccines at hospital discharge was 25.4% (1609/6333). We observed that a majority of physicians ignored the patient education of vaccination regardless of the department, region or work experience. Similarly, an European telephone survey for population aged 50 years and over showed that the perception level and the immunization level of the pneumococcal vaccine were unsatisfactory and the immunization level of the influenza vaccine for the susceptible population was only 41%.<sup>[3]</sup>

Appropriate management of CAP is predominant to improve patients' outcomes as well as reduce bacterial resistance. This national survey proved the effectiveness of serial guideline trainings of CAP guideline in raising physician's awareness, and revealed some major misunderstandings in aspects of the diagnosis and management of CAP among Chinese physicians. As our serial guideline training could improve physician's perceptions, other training projects in China also demonstrated that education could effectively correct wrong practice habits of physicians.<sup>[4]</sup> Moreover, British Thoracic Society (BTS) provided some effective strategies for us to resolve problems.<sup>[5]</sup> To increase the chest imaging application, BTS took a series of measures including setting objectives, promoting CAP care bundle project and performing audit programs, and these measures could be used to improve the drawbacks found by the current survey in China.<sup>[5]</sup>

Some limitations should be considered at the time of interpreting results of our survey. First, the composition of the interviewed population might limit the generalization of results. Respondents in the eastern region account for a majority of participants, and the number of physicians from the Department of Respiratory Medicine and the Emergency Room is overwhelming. There are relatively less responses from the general practitioners in the primary clinical setting. Second, we lack data of the response rate, and the non-responders might have different answers. Third, despite the contents of the questionnaire are quite comprehensive, we still miss some important issues. For example, we did not investigate the combined use of antimicrobial drugs as well as the conditions of intravenous-to-oral switch. For the use of corticosteroids, we failed to include the understanding and management

of hyperglycemia into the questionnaire, which was a noticeable adverse event.

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### Conflicts of interest

None.

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