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# Knowledge, attitudes, and practices towards aphasia among healthcare workers in Anhui, China: a cross-sectional survey

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## Abstract

**Background** The information on knowledge, attitudes, and practices (KAP) related to aphasia among Chinese healthcare workers is scarce. This study aimed to assess the KAP related to aphasia among Chinese healthcare workers, and to identify associated sociodemographic factors.

**Methods** An online cross-sectional survey was distributed to tertiary hospitals in Anhui Province, China. Data were collected from April to July 2023 from a total of 119 full-time healthcare workers—comprising doctors, nurses, and therapists—in neurology, rehabilitation, and other aphasia-related departments. KAP scores were the primary metrics, with frequencies and proportions calculated. Mann–Whitney U and Kruskal–Wallis H tests ($P<.05$) were employed to examine associations between KAP scores and sociodemographic variables.

**Results** Participants generally displayed adequate knowledge (mean score: $6.94 \pm 0.76$), positive attitudes ($56.05 \pm 6.82$), and acceptable practices ($13.79 \pm 4.60$) towards aphasia. Notable gaps were identified in specialized training, personalized treatment strategies, and interdisciplinary collaboration. Sociodemographic factors, such as education, gender, and occupation, were found to correlate with attitudes and practices but not with knowledge. Specifically, males, individuals in rehabilitation departments, and those with doctoral degrees had better KAP scores.

**Conclusions** This inaugural KAP survey on aphasia in China illuminates both the strengths and weaknesses in the current state of aphasia care. Future interventions should focus on targeted strategies that take into account both sociodemographic factors and the gaps identified to optimize aphasia management in China.

**Keywords** Public health, Primary health care, Health services accessibility, Quality in health care

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## Introduction

Aphasia is a communication impairment arising from acquired deficits in language modalities, typically attributed to neurological disorders or trauma, most notably stroke [1–3]. With over 10 million new stroke cases reported globally each year [4], approximately one-third of these patients manifest symptoms of aphasia [5], a debilitating outcome among stroke survivors [6]. Specifically in China, the country witnesses over 2 million new stroke cases annually, growing at an average rate of 8.7%. The economic ramifications of stroke in China surpass 40 billion yuan per year, twice the global average [7, 8]. Individuals with aphasia experience compromised language comprehension and production in both oral and written forms [9] and face challenges in translating thoughts into coherent spoken language [10] across lexical, sentential, and discursive levels [11]. Consequently, aphasia detrimentally impacts not only the affected individuals but also their social network, including family and friends [2].

Healthcare workers play an integral role in managing aphasia [12]. As underscored by Aphasia United, it is imperative that healthcare workers receive adequate training to offer culturally appropriate and individualized care across the treatment continuum [13]. In China, frontline healthcare workers with direct interaction with aphasia patients predominantly include professionals in the neurology and rehabilitation departments, such as doctors, nurses, and therapists. These professionals serve not only as care providers but also as conduits for public health education. Consequently, their knowledge, attitudes, and practices (KAP) concerning aphasia significantly influence both public health outcomes and governmental strategies aimed at mitigating the disease's societal impact.

Despite its importance, aphasia remains an underinvestigated and infrequently discussed topic in China. Virtually no studies exist that explore KAP dimensions of aphasia within any demographic. Addressing this research gap is urgent; existed KAP studies in other contexts have illuminated the areas of focus for public and professional education [14–24]. Understanding healthcare workers' KAP concerning aphasia across various healthcare settings can inform policy decisions, pinpoint training needs, and guide the development of targeted intervention strategies, such as contact tracing and adherence to universal precautions [24]. Any misconceptions, negative attitudes, or underestimations of aphasia among healthcare workers can adversely affect clinical outcomes and compound the economic and societal tolls of the disease. Thus, the present study aims to be the inaugural investigation into the KAP related to aphasia among healthcare workers in China, while also identifying associated socio-demographic factors that may influence these aspects.

## Methods

### Participants

In this quantitative study, an online survey was employed to assess the KAP concerning aphasia among healthcare professionals in the neurology and rehabilitation or other departments in two affiliated hospitals of Anhui Medical University. Participants were conveniently sampled from two tertiary hospitals in Hefei city, Anhui Province, between April and July 2023. Eligibility criteria included: (1) possession of a Nursing Practice Certificate issued by the Ministry of Health of China; (2) a minimum of one year's employment in an aphasia-related department; and (3) voluntary informed consent to participate. Those not employed full-time or unwilling to provide consent were excluded.

### Survey design

To align with the study's objectives and the characteristics of the target population, a modified Chinese version of the KAP survey was self-developed based on consensus on the clinical management post-stroke aphasia in China [25], guidelines issued by stroke foundation [26], and relevant studies.

The self-designed KAP survey (see supplementary material) was composed of four sections: demographics, knowledge, attitudes, and practices, with a total of 29 items. The first, "Demographics" section, contained nine items that captured information such as gender, age, education level, occupation, years in profession, job title, and department (e.g., neurology, rehabilitation). The second section, the knowledge of aphasia, featured eight items divided into two domains: basic concepts and signs and symptoms of aphasia. Three of these questions (item 11, 13 and 14) were negatively worded. For each item, answers were in the form of true, false and do not know. One point was awarded for a correct answer and zero point for a wrong answer. The total score of the knowledge part was 8 points, and the higher the score, the higher the knowledge level of healthcare workers. A cut off level of ≥ 6.94 (mean value) was set for more accurate knowledge in the study. The third section, attitude toward aphasia, comprised 12 items on diagnosis and treatment of aphasia, their roles in intervention and control, and their beliefs about the expected outcome. Each item had the following five options: "strongly disagree," "disagree," "neutral," "agree," or "strongly agree," corresponding to 1–5 points, respectively. These options were ordered in the direction of a more positive attitude. The total score of the attitude questionnaire ranged from 12 to 60, and the higher the score, the more positive the attitude of healthcare workers. A cut-off level of ≥ 56.05

(mean value) was set for more positive attitudes toward aphasia. The fourth one, practice section had 9 items on two domains that include evaluation and intervention. The options for items were ordered by the degree of execution and included "never," "sometimes," and "always," corresponding to 0–2 points, respectively. The total score of the practice questionnaire was 18 points, and the higher the score, the better the self-reported compliance of healthcare workers in practices. A cut-off level of ≥ 13.79 (mean value) was set for more frequent practices.

Before distributing the survey to the main study sample, an initial version was reviewed by a panel of experts, comprising three linguists and three neuroscientists. Their feedback refined various survey elements, including clarity, tone, and length, thereby ensuring its robustness and comprehensibility. The Content Validity Ratio (CVR) and content validity index (CVI) of all items were assessed by the panel and the results supported the content validity of the used tools [27, 28]. The CVR and CVI for were 0.90 and 0.98, respectively. The item-level content validity index (I-CVI) coefficient for each item was > 0.83, the scale-level content validity index/universal agreement (S-CVI/UA) coefficient was 0.76, and the scale-level content validity index/average (S-CVI/Ave) coefficient was 0.94, showing agreement of the judges regarding the adequacy of the questionnaire.

### Data collection

Data were gathered using Wenjuan Xing (https://www.wjx.cn/), a reputable online survey platform commonly utilized in China, from April to July 2023. The survey was self-administered by healthcare workers from two hospitals in Anhui Province, with participants independently completing the questionnaire online. Of the initial 119 surveys submitted, all were retained after reviewing for accuracy and excluding responses with conspicuous errors, resulting in a final dataset of 119 valid questionnaires and an effective response rate of 100%. A post-hoc power analysis yielded a power of 0.83, confirming that the sample size was sufficient to detect significant findings.

### Data analysis

The data were analyzed utilizing Microsoft Excel 2019 and SPSS version 25.0. Post-hoc power analyses were run in G*Power 3.1 software. Microsoft Excel facilitated data manipulation, encompassing editing, sorting, and coding processes. The refined Excel file was subsequently imported into the SPSS software for further analysis. Qualitative data were represented via frequencies (N) and associated percentages (%), while quantitative variables, which did not conform to a normal distribution, were characterized by median values and interquartile ranges (IQR). The Shapiro-Wilk test was executed on the KAP scores, corroborating a non-normal data distribution. Owing to this finding, nonparametric analytical methods, specifically the Mann–Whitney U and Kruskal–Wallis H tests ($P<.05$), were implemented to evaluate potential associations between KAP scores and sociodemographic characteristics. For variables where the Kruskal-Wallis H test revealed significant differences, post-hoc pairwise comparisons using the Dunn-Bonferroni test were conducted to identify specific group differences.

## Results

### Sociodemographic characteristics

A total of 119 healthcare workers completed the survey the demographic composition of which is delineated in Table 1. The mean score for aphasia knowledge was 6.94 (SD = 0.76, range: 0–8), indicating the good knowledge among participants. The participants exhibited a positive attitude towards aphasia, as indicated by a mean attitude score of 56.05 (SD = 6.82, range: 12–60). The mean score for aphasia-related practices was 13.79 (SD = 4.60, range: 0–18), reflective of sound practices. Cumulatively, the mean total score encompassing KAP was 76.78 (SD = 9.08, range: 12–86), signifying a generally positive level of specialization in aphasia care.

In terms of gender, 68.9% were female ($N = 82$), and 31.1% were male ($N = 37$). Age-wise, a majority ($N = 71$, 59.7%) fell within the 31–40 age bracket. Educational attainment was primarily at the bachelor's level ($N = 67$, 56.3%), followed by master's degree ($N = 37$, 31.1%), doctoral degree ($N = 10$, 8.4%), and junior college diploma ($N = 5$, 4.2%). Occupation were predominantly nurses ($N = 51$, 42.9%), followed by doctors ($N = 37$, 31.1%) and therapists ($N = 31$, 26.1%). The participants demonstrated a diverse range of professional experience: 0–5 years (21.9%), 6–10 years (36.1%), 11–15 years (25.2%), and 16 + years (16.8%). Job titles were mainly intermediate ($N = 62$, 52.1%), with fewer holding junior ($N = 36$, 30.3%) and senior titles ($N = 21$, 17.7%). The participants specialized in different departments: rehabilitation ($N = 77$, 64.7%), neurology ($N = 35$, 29.4%), and other departments ($N = 7$, 5.9%).

### Knowledge

Knowledge of aphasia was evaluated using eight questions focused on basic concepts, signs and symptoms, and the overall knowledge score (correct answers) of the participants in the survey was 86.8%, see Table 2. Concerning basic concepts, 116 out of 119 respondents (97.5%) correctly identified aphasia as a language and speech impairment caused by cerebral insult or disease; only one participant harbored a misconception, while two were uncertain. The cohort unanimously agreed that aphasia could manifest across various age groups and circumstances. Additionally, 95.0% of respondents ($N = 113$)

**Table 1** Sociodemographic characters of participants

| Sociodemographic Characteristics | Mean ± SD | Median (IQR) | Min | Max | *N* | % |
|---|---|---|---|---|---|---|
| Knowledge score | 6.94 ± 0.76 | 7(11) | 5 | 8 | | |
| Attitude score | 56.05 ± 6.82 | 59(0) | 12 | 60 | | |
| Practice score | 13.79 ± 4.6 | 15(6) | 0 | 18 | | |
| Total score | 76.78 ± 9.08 | 79(9) | 35 | 86 | | |
| Gender | | | | | | |
| Male | | | | | 37 | 31.1 |
| Female | | | | | 82 | 68.9 |
| Age (years) | | | | | | |
| ≤ 30 | | | | | 33 | 27.7 |
| 31 ~ 40 | | | | | 71 | 59.7 |
| 41 ~ 50 | | | | | 10 | 8.4 |
| ≥ 51 | | | | | 5 | 4.2 |
| Education | | | | | | |
| Junior college diploma | | | | | 5 | 4.2 |
| Bachelor's degree | | | | | 67 | 56.3 |
| Master's degree | | | | | 37 | 31.1 |
| Doctoral degree | | | | | 10 | 8.4 |
| Occupation | | | | | | |
| Doctor | | | | | 37 | 31.1 |
| Nurses | | | | | 51 | 42.9 |
| Therapists | | | | | 31 | 26.1 |
| Years in Profession | | | | | | |
| ≤ 5 | | | | | 26 | 21.8 |
| 6 ~ 10 | | | | | 43 | 36.1 |
| 11 ~ 15 | | | | | 30 | 25.2 |
| ≥ 16 | | | | | 20 | 16.8 |
| Job title | | | | | | |
| Junior | | | | | 36 | 30.3 |
| Intermediate | | | | | 62 | 52.1 |
| Senior | | | | | 21 | 17.6 |
| Department | | | | | | |
| Neurology | | | | | 35 | 29.4 |
| Rehabilitation | | | | | 77 | 64.7 |
| Others | | | | | 7 | 5.9 |

*N* Number of respondents, *StdDeviation* Standard deviation

were aware of the heterogeneity in aphasia types, each with distinct clinical presentations. With regard to the specific signs and symptoms associated with aphasia, a substantial majority ($N = 108$, 90.8%) could recognized potential difficulties in spoken language comprehension. Moreover, 84.9% of participants ($N = 101$) were aware that individuals with aphasia might also experience challenges in reading and writing. A notable 94.1% ($N = 112$) of respondents were cognizant of the frequent naming difficulties encountered by aphasia patients. In exploring the perceived link between aphasia, intelligence, and cognitive capabilities, 64.7% of the cohort ($N = 77$) held the incorrect view that no direct relationship exists. In contrast, 31.9% ($N = 38$) disagreed, and a minimal proportion ($N = 4$, 3.4%) expressed uncertainty on the matter.

### Attitudes

The study assessed attitudes toward aphasia via 12 questions focused on aphasia diagnosis, treatment, healthcare workers' roles, and expected outcomes, and the overall attitude score (positive attitude) of the participants in the survey was 93.4%, with a mean score of 50.69 ± 3.96, see Table 3.

Participants were first asked about the diagnosis and treatment of aphasia, more than half participants ($N = 76$, 63.9%) strongly believed that under proper support, symptoms can be improved, and over a third of the participants ($N = 38$, 31.9%) shared the similar concepts. When dealing with aphasia, most respondents strongly agreed that promoting awareness ($N = 95$, 79.8%), understanding communications ($N = 94$, 79.0%), encouraging relationships ($N = 84$, 70.6%) are essential. Concerning their role in intervention and control, respondents strongly

**Table 2** Knowledge of aphasia in participants

| No. | Knowledge items | True | | False | | Do not know | |
|---|---|---|---|---|---|---|---|
| | | *N* | % | *N* | % | *N* | % |
| Basic concepts | | | | | | | |
| 1 | Aphasia affects a person's ability to use and understand language due to brain injury or disease. | 116 | 97.5 | 1 | 0.8 | 2 | 1.7 |
| 2 | Aphasia only occurs in people who have had a stroke. | 0 | 0 | 119* | 100 | 0 | 0 |
| 3 | Aphasia can affect people of any age, including children and adults. | 119 | 100 | 0 | 0 | 0 | 0 |
| 4 | There is only one type of aphasia, and it affects all individuals in the same way. | 5 | 4.2 | 113* | 95.0 | 1 | 0.8 |
| Signs and symptoms | | | | | | | |
| 5 | Individuals with aphasia always understand spoken language without any difficulties. | 10 | 8.4 | 108* | 90.8 | 1 | 0.8 |
| 6 | Aphasia can cause problems with reading and writing abilities. | 101 | 84.9 | 15 | 12.6 | 3 | 2.5 |
| 7 | People with aphasia often struggle with using the correct words or naming objects. | 112 | 94.1 | 7 | 5.9 | 0 | 0 |
| 8 | Aphasia does not affect a person's intelligence or cognitive abilities unrelated to language. | 38 | 31.9 | 77 | 64.7 | 4 | 3.4 |
| | Overall percentage (correct answers) 86.75% | | | | | | |
| | Mean ± SD (correct answers) 6.94 ± 0.76 | | | | | | |
| | Minimum-maximum score 0–8 | | | | | | |

*Correct answer

**Table 3** Attitude toward aphasia in participants

| No. | Attitude Items | Strongly Disagree | | Disagree | | Neutral | | Agree | | Strongly Agree | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *N* | % | *N* | % | *N* | % | *N* | % | *N* | % |
| Diagnosis and treatment | | | | | | | | | | | |
| 1 | With appropriate support, individuals with aphasia can improve their communication skills. | 1 | 0.8 | 2 | 1.7 | 2 | 1.7 | 38 | 31.9 | 76 | 63.9 |
| 2 | People with aphasia should be encouraged to participate in social activities and maintain relationships. | 1 | 0.8 | 1 | 0.8 | 1 | 0.8 | 32 | 26.9 | 84 | 70.6 |
| 3 | Patience and understanding are crucial when communicating with someone with aphasia. | 1 | 0.8 | 1 | 0.8 | 3 | 2.5 | 20 | 16.8 | 94 | 79.0 |
| 4 | Society should be more informed and educated about aphasia to reduce stigma and misconceptions. | 1 | 0.8 | 1 | 0.8 | 1 | 0.8 | 21 | 17.6 | 95 | 79.8 |
| Intervention and control | | | | | | | | | | | |
| 5 | My support as a healthcare worker plays a significant role in the recovery and well-being of the person with aphasia. | 1 | 0.8 | 1 | 0.8 | 0 | 0.0 | 23 | 19.3 | 94 | 79.0 |
| 6 | Healthcare workers should be actively involved in the therapy process for individuals with aphasia. | 1 | 0.8 | 1 | 0.8 | 0 | 0.0 | 24 | 20.2 | 93 | 78.2 |
| 7 | It is important for healthcare workers to continuously update their knowledge about aphasia and caregiving strategies. | 1 | 0.8 | 1 | 0.8 | 0 | 0.0 | 24 | 20.2 | 93 | 78.2 |
| 8 | Healthcare workers should collaborate with healthcare professionals to ensure appropriate care for individuals with aphasia. | 1 | 0.8 | 1 | 0.8 | 1 | 0.8 | 23 | 19.3 | 93 | 78.2 |
| Expected outcome | | | | | | | | | | | |
| 9 | I feel confident in my ability to adapt my communication style to meet the needs of patients with aphasia. | 1 | 0.8 | 3 | 2.5 | 12 | 10.1 | 34 | 28.6 | 69 | 58.0 |
| 10 | I am willing to learn and implement new strategies to support patients with aphasia in their daily life. | 1 | 0.8 | 1 | 0.8 | 4 | 3.4 | 34 | 28.6 | 79 | 66.4 |
| 11 | It is essential to provide emotional support and empathy to patients with aphasia and their families. | 1 | 0.8 | 1 | 0.8 | 0 | 0.0 | 30 | 25.2 | 87 | 73.1 |
| 12 | It is important to educate family caregivers on how to support and communicate effectively with their loved ones with aphasia. | 1 | 0.8 | 1 | 0.8 | 0 | 0.0 | 26 | 21.8 | 91 | 76.5 |
| | Overall percentage (positive attitude) 93.41% | | | | | | | | | | |
| | Mean ± SD (positive attitude) 56.05 ± 6.82 | | | | | | | | | | |
| | Minimum-maximum score 12–60 | | | | | | | | | | |

agreed their importance in recovery ($N=94$, 79.0%) and active participation in therapy ($N=93$, 78.2%), continued knowledge updates ($N=93$, 78.2%), and a broader collaboration with cross-cutting experts ($N=93$, 78.2%) might assist in therapy. With respect to the expected outcome of intervention, just over half strongly felt confident in accommodating the needs of aphasia patient ($N=69$, 58.0%), and fully expected to learn and implement new strategies ($N=79$, 66.4%). Over 70% of the respondents were in strong agreement that healthcare professionals should empathize and educate both patients with aphasia and their families.

### Practices

Practices relating to aphasia were assessed through nine questions exploring assessment and intervention techniques, and the overall practice score (positive practice) of the participants in the survey was 76.61%, with a mean score of 13.79 ± 4.60, as presented in Table 4. In the domain of assessment techniques, responses exhibited a relatively balanced distribution. Specifically, a majority of participants indicated that they 'always' engaged in several key practices: involving patients' family members in assessments ($N=70$, 58.8%), considering the individual needs of patients ($N=69$, 58.0%), periodically reassessing patient progress ($N=68$, 57.1%), conducting comprehensive evaluations ($N=66$, 55.5%), and collaborating with other healthcare professionals ($N=50$, 50.4%).

Regarding intervention strategies, a substantial proportion of participants reported consistent engagement in activities that enhance both communication and cognitive skills ($N=86$, 72.3%). Moreover, education was extended to both patients and their families ($N=79$, 66.4%), and individualized intervention plans were commonly implemented ($N=74$, 62.6%). However, it is worth noting that collaboration with interdisciplinary professionals was somewhat lacking: 37.8% ($N=45$) reported only 'sometimes' collaborating, while 11.8% ($N=14$) indicated they 'never' engaged in such collaborative care for aphasia patients.

### Association between sociodemographic characteristics and KAP scores

The interrelationship between sociodemographic factors and KAP scores concerning aphasia is elucidated in Table 5. Although the knowledge component did not evince a statistically significant correlation with any sociodemographic variables, the attitude and practice scores exhibited noteworthy associations with particular characteristics. A statistically significant correlation ($p<.05$) was observed between attitude scores and two specific sociodemographic attributes—education level and departmental affiliation. Specifically, participants holding doctoral degrees and those aligned with rehabilitation departments manifested more favorable attitudes towards aphasia relative to other groups. Post-hoc

**Table 4** Practices toward aphasia in participants

| No. | Practice Items | Never perform | | Sometimes perform | | Always perform | |
|---|---|---|---|---|---|---|---|
| | | *N* | % | *N* | % | *N* | % |
| Assessment | | | | | | | |
| 1 | I consistently perform comprehensive assessments to identify the specific communication needs of my patients with aphasia. | 5 | 4.2 | 48 | 40.3 | 66 | 55.5 |
| 2 | I collaborate with other healthcare workers, such as speech-language pathologists and occupational therapists, to evaluate the functional abilities of patients with aphasia. | 9 | 7.6 | 50 | 42.0 | 60 | 50.4 |
| 3 | I consider the individual preferences, goals, and social context of my patients with aphasia when conducting assessments. | 5 | 4.2 | 45 | 37.8 | 69 | 58.0 |
| 4 | I regularly reassess the progress of my patients with aphasia to adjust treatment plans accordingly. | 10 | 8.4 | 41 | 34.5 | 68 | 57.1 |
| 5 | I involve patients with aphasia and their families in the assessment process to ensure a holistic understanding of the patient's needs. | 9 | 7.6 | 40 | 33.6 | 70 | 58.8 |
| Intervention | | | | | | | |
| 6 | I actively participate in the development and implementation of tailored intervention plans for my patients with aphasia. | 5 | 4.2 | 40 | 33.6 | 74 | 62.2 |
| 7 | I educate patients with aphasia and their families on strategies to improve communication and daily functioning. | 2 | 1.7 | 38 | 31.9 | 79 | 66.4 |
| 8 | I encourage patients with aphasia to engage in activities and therapies that promote language and cognitive skills. | 3 | 2.5 | 30 | 25.2 | 86 | 72.3 |
| 9 | I collaborate with an interdisciplinary team to provide comprehensive and coordinated care for patients with aphasia. | 14 | 11.8 | 45 | 37.8 | 60 | 50.4 |
| | Overall percentage (positive practices) 76.61% | | | | | | |
| | Mean ± SD (correct answers) 13.79 ± 4.60 | | | | | | |
| | Minimum-maximum score 0–18 | | | | | | |

**Table 5** Association between sociodemographic characters and KAP scores related to aphasia

| Sociodemographic Characteristics | *N* | % | Knowledge Score | | | Attitude Score | | | Practice Score | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mean ± SD | Median (IQR) | *P* | Mean ± SD | Median (IQR) | *P* | Mean ± SD | Median (IQR) | *P* |
| Gender | | | | | | | | | | | |
| Male | 37 | 31.1 | 6.92 ± 0.722 | 7 (0) | 0.904 | 57.49 ± 4.127 | 60 (3) | 0.206 | 15.41 ± 3.693 | 18 (5.5) | 0.008 |
| Female | 82 | 68.9 | 6.95 ± 0.784 | 7 (0) | | 55.4 ± 7.669 | 59 (7) | | 13.06 ± 4.808 | 14 (9) | |
| Age (years) | | | | | | | | | | | |
| ≤ 30 | 33 | 27.7 | 7.06 ± 0.659 | 7 (0.5) | 0.393 | 54.0 ± 10.553 | 59 (10.5) | 0.425 | 12.91 ± 4.496 | 13 (8.5) | 0.082 |
| 31 ~ 40 | 71 | 59.7 | 6.94 ± 0.735 | 7 (0) | | 56.42 ± 4.816 | 59 (6) | | 14.18 ± 4.755 | 17 (8) | |
| 41 ~ 50 | 10 | 8.4 | 6.90 ± 0.876 | 7 (0.5) | | 58.60 ± 1.647 | 59 (3.25) | | 12.60 ± 3.921 | 13 (6.75) | |
| ≥ 51 | 5 | 4.2 | 6.20 ± 1.304 | 6 (2.5) | | 59.20 ± 1.789 | 60 (2) | | 16.40 ± 3.578 | 18 (4) | |
| Education | | | | | | | | | | | |
| Junior college diploma | 5 | 4.2 | 7.00 ± 0.707 | 7 (1) | 0.883 | 53.40 ± 5.505 | 53 (9) | 0.037 | 10.60 ± 5.225 | 9 (9) | 0.171 |
| Bachelor's degree | 67 | 56.3 | 6.91 ± 0.733 | 7 (0) | | 56.04 ± 4.894 | 58 (7) | | 13.45 ± 4.537 | 14 (9) | |
| Master's degree | 37 | 31.1 | 6.97 ± 0.763 | 7 (0) | | 56.30 ± 9.896 | 60 (2.5) | | 14.84 ± 4.419 | 17 (6) | |
| Doctoral degree | 10 | 8.4 | 7.00 ± 1.054 | 7 (2) | | 56.50 ± 4.950 | 58.5 (6) | | 13.80 ± 5.095 | 16.50 (8.25) | |
| Occupation | | | | | | | | | | | |
| Doctor | 37 | 31.1 | 7.00 ± 0.913 | 7 (1) | 0.088 | 56.70 ± 8.524 | 60 (2.5) | 0.055 | 15.24 ± 4.126 | 18 (4.5) | 0.001 |
| Nurse | 51 | 42.9 | 6.78 ± 0.783 | 7 (1) | | 55.43 ± 4.933 | 57 (10) | | 11.98 ± 4.856 | 13 (8) | |
| Therapists | 31 | 26.1 | 7.13 ± 0.428 | 7 (0) | | 56.29 ± 7.345 | 59 (3) | | 15.03 ± 3.737 | 17 (8) | |
| Years in Profession | | | | | | | | | | | |
| ≤ 5 | 26 | 21.8 | 7.08 ± 0.628 | 7 (0.25) | 0.352 | 53.81 ± 10.040 | 59 (12) | 0.173 | 13.04 ± 5.111 | 15 (9) | 0.090 |
| 6 ~ 10 | 43 | 36.1 | 6.98 ± 0.636 | 7 (0) | | 57.05 ± 6.332 | 60 (2) | | 14.79 ± 4.642 | 18 (6) | |
| 11 ~ 15 | 30 | 25.2 | 7.00 ± 0.830 | 7 (1) | | 55.47 ± 5.237 | 57 (8.25) | | 12.70 ± 4.372 | 13 (8.25) | |
| ≥ 16 | 20 | 16.8 | 6.60 ± 0.995 | 7 (1) | | 57.70 ± 3.629 | 59.5 (4) | | 14.25 ± 3.932 | 14.50 (6.75) | |
| Job title | | | | | | | | | | | |
| Junior | 36 | 30.3 | 6.97 ± 0.609 | 7 (0) | 0.976 | 54.00 ± 10.178 | 59 (10.75) | 0.153 | 12.97 ± 5.364 | 15 (9) | 0.527 |
| Intermediate | 62 | 52.1 | 6.94 ± 0.787 | 7 (0) | | 56.47 ± 4.776 | 59 (6) | | 14.15 ± 4.192 | 15 (8.25) | |
| Senior | 21 | 17.6 | 6.90 ± 0.944 | 7 (0.5) | | 58.33 ± 3.152 | 60 (3) | | 14.14 ± 4.419 | 16 (8) | |
| Department | | | | | | | | | | | |
| Neurology | 35 | 29.4 | 6.80 ± 0.901 | 7 (1) | 0.584 | 53.97 ± 8.662 | 56 (11) | 0.009 | 11.94 ± 4.795 | 12 (7) | < 0.001 |
| Rehabilitation | 77 | 64.7 | 7.00 ± 0.707 | 7 (0) | | 57.13 ± 5.716 | 60 (3) | | 15.00 ± 4.000 | 17 (5) | |
| Others | 7 | 5.9 | 7.00 ± 0.333 | 7 (0) | | 54.57 ± 5.740 | 56 (12) | | 9.71 ± 5.122 | 9 (4) | |

pairwise comparisons using the Dunn-Bonferroni test confirmed that participants from rehabilitation departments had significantly higher attitude scores compared to those in neurology (adjusted $p<.05$), while no significant differences were identified between participants of different educational levels (adjusted $p>.05$). Moreover, practice scores were significantly influenced by three sociodemographic variables: gender, professional role, and departmental affiliation ($p<.05$). Males, medical doctors, and professionals stationed in rehabilitation departments collectively registered elevated practice scores, thereby suggesting more efficacious approaches to aphasia management. Post-hoc analysis supported these findings, revealing specific relationships among the variables. In terms of professional roles, significant differences in practice scores were observed between doctors and nurses, as well as between doctors and therapists (adjusted $p<.05$), with doctors consistently achieving higher scores. Regarding departmental affiliation, significant differences were found between neurology and rehabilitation departments, as well as between rehabilitation and other departments (adjusted $p<.05$).

## Discussion

To our best knowledge, this is the first KAP study towards aphasia among healthcare workers in China and provides a contribution to the understanding of aphasia issue in Asian clinical settings. The results reveal that Chinese healthcare workers exhibited good knowledge of aphasia while there is still room for improvement in attitudes and practices.

Among the participants, the overall veracious knowledge score was 86.75%, indicating that most healthcare workers possessed a good understanding of aphasia regarding its basic concepts as well as symptoms and signs. This finding is consistent with the findings of other studies that demonstrate that healthcare workers have satisfactory levels of knowledge in Singapore [14], Exeter [21], and India [16]. In general, people who are aware of aphasia are professionals, such as hospital workers, professionals, and students at universities, excluding the public. In our study, the high rate of correct answers to knowledge-related questions among participants, was as expected. One possible reason for the consistent results across these studies is that healthcare professionals are required to keep up-to-date with the latest knowledge and practices in their field in order to maintain their licenses and certifications [29], thereby ensuring the dissemination and application of contemporary, evidence-based practices.

However, there was a high level of confusion among neurologists and rehabilitation specialists regarding the management of clinical guidelines for poststroke aphasia [30]. Similar findings can also be observed in previous studies [31–33]. These discrepancies could potentially arise from the lack of standardized clinical guidelines [30] and divergent emphases between studies, with the present investigation concentrating on foundational knowledge and previous research focusing on specialized skills. Intriguingly, despite their medical education background, approximately one-third of respondents incorrectly believed that aphasia would not adversely affect patients' cognitive and intellectual abilities. This misconception has also been found in previous studies [14, 34]. A possible explanation for this might be that aphasia is difficult to recognize and comprehend because of its literal term referring to language impairment without the consequence of the disease, and its hidden and variable nature [2, 24]. Failure to cope with aphasia and misconception might negatively impact upon the provision of care and services. Therefore, the findings underscore the imperative for multi-tiered educational and training programs, encompassing stages from undergraduate education to ongoing professional development, in order to ameliorate these knowledge gaps.

Concerning attitudes, the overall positive attitude score was 93.41%, indicating that most healthcare workers possess optimistic perspectives concerning their role in diagnosis and capacity to detect patients with aphasia. Moreover, most of them concur that providing medical and emotional support would benefit aphasia patients and their family. These affirmative stances align with previous research [15, 35], where caregivers were convinced that their significant therapeutic role strengthened their companionship with patients with aphasia. Such attitudes are explicable by the human-centered interaction required to ensure the effective communication between a range of health and social care practitioners and individuals who may have different conditions with or without communication difficulties [36].

However, the study also unveiled that a minor proportion of healthcare workers displayed reservations about adapting their communicative strategies to meet the individualized needs of aphasia patients. This finding resonates with research conducted in Australia, wherein speech-language pathologists confronted challenges in adhering to recommendations for personalized communication during aphasia rehabilitation [37]. This is not surprising given some studies reported that barriers to optimal aphasia treatment included limited access to resources [37], inadequate research [16], and the inability to understand the nature of what has happened for patients with aphasia [34, 36]. These fear and discomfort in communication might cause distress for a person with aphasia and add to his or her experience of feeling isolated and objectified [36]. In light of these findings, it becomes apparent that targeted educational initiatives are warranted in China to enhance healthcare

professionals' role perception in aphasia management and alleviate resource constraints. Such interventions could potentially foster more individualized, patient-centered approaches, thereby improving the quality of aphasia care.

The overall positive practices score was 76.61%, suggesting that healthcare workers exhibit satisfactory practical behaviors in both assessment and intervention, albeit not flawless. This finding aligns with a parallel KAP study that investigated post-stroke cognitive impairment among Chinese healthcare professionals [38]. Despite adequate awareness and positive attitudes toward aphasia, a disparity exists in the actual application of this knowledge and disposition. A noteworthy observation is the inconsistent involvement in interdisciplinary collaboration. Although a significant proportion of participants reported sporadic engagement with professionals from other disciplines, a smaller segment indicated an absence of such collaborative efforts. This trend merits attention, given the critical role of interdisciplinary teamwork in delivering comprehensive care to aphasia patients. Scholars cited obstacles to effective collaboration, such as high work intensity across departments, time constraints, and funding limitations [39]. Additionally, during periods of acute medical exigencies, healthcare providers often prioritize life-threatening conditions over communication disorders, thereby relegating interdisciplinary collaboration to lesser importance [40].

Given these findings, there is an immediate need for a multi-disciplinary approach that encourages integrated practice. Researchers and stakeholders from various disciplines should collaboratively advocate for institutional policies that foster such teamwork [2, 41–43]. These endeavors are essential for bridging the existing gap between knowledge and practice in aphasia management, thereby ensuring a more holistic and effective care paradigm.

In the current investigation, no statistically significant association was found between sociodemographic characteristics and aphasia-related knowledge levels. This observation corroborates the extant literature, which reveals a lack of uniform correlations [44]. For example, Guinan and Carroll [44] observed that educational attainment, rather than gender, influenced aphasia knowledge among hospitality students. A similar pattern was found by Hill [21] in a study examining public perceptions of aphasia. This variability may be attributed to the heterogeneity of the study populations and their diverse cultural backgrounds, thereby rendering sociodemographic factors inconsistent predictors of aphasia awareness.

The observation of no statistically significant association between sociodemographic characteristics and aphasia-related knowledge levels may suggest that variables beyond demographics, such as professional training or standardized educational programs, may play a more prominent role. It is plausible that the healthcare professionals in this sample received comparable training and exposure to information on aphasia, resulting in similar knowledge levels across different demographic groups. This indicates that educational efforts in healthcare settings may be successfully disseminating information consistently across diverse populations. Nevertheless, other influences, such as clinical experience or workplace culture, may also impact aphasia awareness, warranting further investigation [45, 46].

In contrast, both attitude and practice scores revealed significant associations with specific sociodemographic variables. Attitudinal scores were notably linked to departmental affiliation, with some evidence suggesting a potential, though inconclusive, relationship with education level, partially corroborating previous research [18, 47, 48]. Specifically, professionals in rehabilitation departments displaying more positive attitudes towards aphasia, likely due to specialized training and greater exposure compared to neurology professionals [49]. Although healthcare workers with higher educational qualifications, such as doctoral degrees, initially appeared to have more favorable attitudes, post-hoc analysis revealed no statistically significant differences between educational levels. This finding suggests that while advanced education enhances theoretical knowledge, it does not necessarily lead to significantly different attitudes, as participants with junior college diploma also scored relatively high.

Divergences in practice scores were influenced mainly by gender, occupation, and departmental affiliation. Notably, positive practices were more prevalent among male participants, medical doctors, and professionals in rehabilitation departments. While the underlying causal mechanisms require further exploration, existing literature suggests that these disparities could arise from gender-related differences in professional roles and approaches to patient care [50, 51]. Male healthcare providers, often doctors, may use a task-oriented communication style, enhancing efficiency in assessment and intervention. Their assertiveness in interdisciplinary collaboration could also enhance their aphasia management skills [52]. High practice scores in rehabilitation departments likely reflect their emphasis on long-term, patient-centered care rather than acute cases.

Nevertheless, these observations warrant cautious interpretation to avoid overgeneralization. Multiple influencing factors, including societal norms, workplace dynamics, and access to specialized training, may contribute to these gender-specific practice patterns.

### Strengths and limitations

One of the salient strengths of this study lies in its methodological rigor, specifically the tailored KAP survey exhibiting high content validity. The survey, developed through meticulous review of current research and official guidelines, was vetted for internal validity by a panel of linguistic and neuroscientific experts. Furthermore, this investigation pioneers the study of KAP specific to aphasia within the Chinese healthcare sector. As such, it offers critical insights into the hitherto overlooked KAP perspectives of Chinese healthcare professionals, thereby assisting stakeholders in devising interventions that are both effective and congruent with the needs of aphasia patients.

Nevertheless, the study is not without its limitations. Due to limited resources and gender bias among departments, our survey sample was highly selective, and 82 women and those aged 31 to 40 years are over-represented, but not by a significant margin. Thus, the data are not representative of the general healthcare workers and any conclusions should be drawn with caution. There is potential risk of selection bias as we only collected data from two affiliated hospital of our university. Also, respondents might have provided outcomes that were over- or underestimated in order to meet social desire, which may not always align with actual attitudes and practices. However, the bias was minimized by making it anonymous and ensuring respondents' confidentiality.

Hence, future research should adopt a more diverse sampling strategy with larger sample size to enhance the generalizability of the findings. Implementing a mixed-mode approach could yield a more comprehensive understanding of health workers' actual KAP performance, thereby fortifying the study's applicability across various clinical settings.

## Conclusions

The first KAP survey toward aphasia in China reveals that healthcare workers generally exhibit commendable levels of knowledge, although their favorable attitude and practices require further refinement. Notably, the study identifies key areas for improvement, including the necessity for multi-level professional training, alleviation of resource constraints for individualized treatments, and the fostering of interdisciplinary collaboration. While the study found no significant correlations between aphasia-related knowledge and sociodemographic variables, associations did emerge between attitudes and practices with certain sociodemographic factors. Specifically, healthcare workers possessing doctoral degrees and affiliations with rehabilitation departments demonstrated elevated levels of positive attitudes. Furthermore, male respondents, medical doctors, and those associated with rehabilitation departments exhibited superior practice scores. These findings suggest the potential efficacy of targeted educational interventions and strategic adjustments in gender, occupation, and departmental affiliations to elevate the levels of attitudes and practices concerning aphasia management. This study, therefore, serves as a foundational assessment, highlighting both the strengths and gaps within the current landscape of aphasia care in China. It offers empirically grounded data that could guide future interventions aimed at bolstering healthcare professionals' effectiveness in managing aphasia, thereby enhancing the overall quality of care.

## Supplementary Information

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Supplementary Material 1.

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#### Authors' contributions

The study was conceived and designed by BL. and YX. Data collection was carried out by BL with support of local field staff. Data were analyzed and interpreted by BL and YLC. with support from the institution. Drafting and revision of the manuscript were carried out by BL and SLY. All authors reviewed and approved the methodology and read and approved the final version.

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#### Data availability

Data are available on request by contacting the author upon reasonable request.

## Declarations

#### Ethics approval and consent to participate

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The Ethics Committee of Anhui Medical University approved all procedures of the current study (Approval Number: 20210553). Informed consent to participate is obtained from all the participants.

#### Consent for publication

Not required.

#### Competing interests

The authors declare no competing interests.

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## Publisher's Note