A Qualitative Study on the Factors Influencing the Quality of BSID-CR Test

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Abstract—Objective The factors that influence the clinical test of BSID-CR were discussed from two angles of the BSID-CR tester and the parents of the tested infants, so as to provide references for BSID-CR quality control intervention research and promote the improvement of BSID-CR test quality. Methods Based on phenomenological research method, the researchers went deeply into the BSID-CR test field observation. A purposive sample of BSID-CR tester and infants' parents in a total of 21 depth interviews, of which were parents of infants in 16 copie, 5 copies of the BSID-CR tester at some Maternal and Child Healthcare Hospital in Wuhan city of Hubei province. Applying semi-structured interviews, Colazzi7 step analysis was used to analyze the data of in-depth interviews. Results the factors that affect the BSID-CR test includes the following four themes: the factors from subjects of infants and parents, BSID-CR tester factors, the environmental factors and factors derived from the scale itself. Conclusion it is suggested that clinical staff can establish the quality control intervention measures to further improve the test quality level, and ultimately promote the continuous improvement of medical quality.

Keywords—Bayley scales of infant and toddler development; influencing factors; qualitative research; quality control

I. INTRODUCTION

Bayley scales of infant and toddler development revised in Chinese cities(BSID-CR), is one of the most commonly used assessment scales for neuropsychological development of infants and toddler in China [1].BSID-CR is revised and standardized in 1993 [2].It consists of three complementary parts: intelligence scale, exercise scale and behavior record. In Chinese hospitals, BSID-CR commonly used in our country at present, is a kind of auxiliary diagnosis scale of infant development condition. However, the clinical evaluation process of BSID-CR has the characteristics of longer evaluation time, more complicated operation and complex analysis, etc. Researchers at home and abroad have proposed that it is necessary to carry out relevant quality control research in the process of clinical evaluation of BSID-CR [3,4,5]. According to their own research characteristics, foreign researchers have taken appropriate measures to improve the reliability of scores among BSID testers currently [3].There are no reports on the quality control of BSID-CR clinical evaluation in China. Taking phenomenological research method as the starting point, the author interviewed BSID-CR testers to analyze and refine the influencing factors of the quality of BSID-CR testing, and to explore the quality control of clinical evaluation of BSID-CR.

II. OBJECTS AND METHODS

During the process, the author used the target sampling method to select study objects. Follow the principle of data saturation in qualitative research [6], from September 2016 to January 2017, 5 subjects (coded A / D) and 16 infant parents (coded J1-J16) were tested for BSID-CR in a Grade 3A Maternal and Child Healthcare Hospital. Among them, the parents of the tested infants were included in the criteria: voluntary participation, 18~80 years old, conscious, able to act, the subject's primary caregiver (parent or next of kin). Testers inclusion criteria: consent to participate in interviews.

Our study was based on the phenomenological research method and the on-site observation method, following the ethical principles. Before the interview, we explain to the interviewees the purpose of the interview, the subject of the interview, the interview method and the principle of research confidentiality, and sign the informed consent form.

Through the reading of qualitative research books, pre-interviews and consultation with relevant experts, we revised and adjusted the interview outline. The interview outline of BSID-CR testers: (1) Based on your BSID-CR test cases, what do you think is the status quo of BSID-CR clinical testing? Can you talk specifically about your test experience? (2) In the course of clinical testing, what factors do you think affect the test?(such as BSID-CR's operating specification description is clear and easy to understand good for operation, people: tested infants and parents, human resources, test equipments or test environment). (3) Regarding the current status of clinical testing, what aspects do you think are good about the BSID-CR clinical test? What needs further improvement? If you are a beginner, what key points should you pay attention to when testing? Please combine some specific examples to describe and discuss.

The interview outline of BSID-CR participant parents: (1) Have you learned about the BSID-CR test before coming?(2) Do you know what state of the baby (physical, emotional, etc.) is better tested?(3) What do you think of the waiting environment in the corridor (the outdoor environment of Intelligence Test room)? What will these factors affect the child's test, such as dim, messy, noisy, temperature and humidity, etc.? (4) What...
do you think of the intelligence room environment (indoor environment of the room)? Would these affect your child's testing? (such as wall color, table and chair height, etc.) (5) The gender of the doctors would affect the child's test? (6) How was the attitude of the test doctor? Was the doctor impatient? Was there the situation that urged your child to test? (7) Would this affect the child's test that the doctor wore a white coat during clinical test? (8) How do you think the child test is playing today? Was it the same level of performance as at home? If not, can you talk about why? In addition to the above factors we talked about, in your opinion, what other factors affect the children's test? In the formal interview, the researchers went deep into the BSID-CR test site to observe. And semi-structured interviews were conducted on the subjects. We used synchronous recording mode to interview the testers after the test was over. The parents of infants being tested interviewed the time when the BSID-CR test was completed and the test results were awaited. The interview time was 10~50min. Researchers tried to avoid situational induction, while observing the changes in movements and expressions of interviewees.

Interview data collation and analysis were carried out simultaneously. The recording material was transcribed verbatim within 24 hours after the interview. We used the Colaizzi phenomenological data 7-step analysis method and the conjunction method [7], combined with interview records to organize and analysis the data.

III. RESULTS

Through interview analysis, the four main themes of the BSID-CR test are extracted: the factors from subjects of infants and parents, BSID-CR tester factors, the environmental factors and factors derived from the scale itself.

Theme 1: The factors of the infants and their parents

Infants: influencing factors in infants and toddlers mainly include infants' personality, care environment, social adaptability, physiological state before test that means no hunger, urinary and dysfunction problems and non-daily sleep time, the infants and toddlers' main caregivers are not their parents and the emotional state during clinical test. BSID-CR tester A: 'For Young children, it is essential to ensure their physical problems (saturated and urinary) to be solved, their emotion to be ready for testing, specially avoiding daily sleep time), (otherwise) the infant was afraid or irritated when he came in, he or she did not cooperate with us.' BSID-CR tester D: '(relatively speaking) if the main caregiver was his or her mother, the test would be more cooperative.' BSID-CR tester B: 'Last time I did a test, the little child was going to fall asleep, and the head was like this (simulating the child's sleeping posture). I asked what was wrong with this, and then the parents said that the children usually sleep at this time'. Parent of the subject J9: 'For example, our baby’s personality is introverted, slower, and lacks a sense of security in a strange environment. Then he would go in for a long time before entering the test state, or not at all.'

Parents of infants or toddlers being tested: during the testing process, parents did not consciously urge the infants to perform their words and deeds, distracting the participants. BSID-CR tester A: 'The deeds that parents urging children would affect the test.' BSID-CR tester D: 'Parents were afraid that the infants and toddlers wouldn’t complete the test correctly as required to get high scores. They couldn’t control themselves during the test and reminded the children repeatedly.'

Theme 2: BSID-CR Tester factors

Combined with clinical observation, the test factors are as follows: the gender of the tester, the age, the clothing during testing process, the proficiency of the tester's operation on the BSID-CR, whether the tester regularly participates in the training, the testers’ attitude during the clinical test, whether or not to urge the infants to project themselves, testers’ workload, and remuneration. Tester C: 'The key is the BSID-CR testers’ proficiency.' He also said: 'When more subjects were in line, the tester had a high work intensity. The appointment system is better. For example, 15 infants were scheduled in the morning. This would ensure the quality of the test.' Tester A: 'In particular, the testing process would encounter very detailed problems. This requires more detailed and precise training.' Parent of the subject J10: 'Test doctor’s gender has a certain impact on the test. Some children may be afraid of older male doctors.' Parents mentioned that there were a 'white coat phenomenon', which would make the infants automatically associate with the diagnosis of pain during the previous visit [8], which would seriously affect the BSID-CR test. Parent of the subject J9: 'When the baby came to the hospital and saw the medical worker wearing a white coat, he would cry: ‘no injection!’

Theme 3: environmental factors in Intelligence test process

The indoor environmental factors include environmental safety, noise, space size, test item layout, indoor wall design, and interference from outdoor patients waiting in line. The light of waiting area environment, temperature and humidity of the outdoor environment hindered the BSID-CR test. And 5 parents thought that designing the wall of the intelligent test room according to the physiological and psychological development characteristics of infants would be beneficial to the BSID-CR test. For example, the layout of items in the test room, Tester B put forward: 'When testing the Row wood, motors test equipment from BSID-CR test, the infants should move it. However the subject always misunderstand and also followed the tester’s imitation action, the attention was completely out of the test.' And the tester A proposed in the test interference: 'For example, when doing the limited time item, it is impossible to avoid the parent who opens the door to ask for directions, the subject's attention is very short, (after the attention is interrupted), the corresponding test time will be extended.'

Theme 4: The scale itself

BSID-CR scale factors: these factors that including Long test time, the fuzzy description of some test items 'practical guide, the recommended test sequence of the scale and the actual clinical work have conflicting effects on the BSID-CR test, affect the test. Tester A: 'Test Entry 142: Installing Broken Dolls, The item described that put the test doll's broken face up is confusing. Does it mean Put the test doll's broken side up or
BSID-CR Test tools factors: BSID-CR test tools were provided by the test training center. There are mainly intelligence test equipment (such as square wood, red ring, spoon, car, picture book, map card, broken head baby, etc.) and motor test equipment (such as small sugar pills, drums, exercise mats, ladders, walking wood, towing toys, etc.). The design of some test tools and the tool itself distracting the short-term attention affect the BSID-CR test. For example, in the test entry of "Look at the picture and draw the name", testerB: "The animals on the test card aren't images." Parent of the subject J11: "The card was monotonous and difficult to distinguish." In the test entry "sideways" and "reverse walking" tester A: "the pulling tool (yellow duck) severely distracted a considerable part of the subject's attention, causing the infant or toddler not to do the motor test."

IV. DISCUSSION
Analysis of Factors Affecting BSID-CR Test Quality

Infants and their parents have difficulty understanding on the BSID-CR test. There are many types of infant development scales, and it is difficult for parents to distinguish them. Moreover, from the interview results of the infants’ or toddlers’ parents participated in BSID-CR test, parents' perception of the BSID-CR test was insufficient, suggesting that targeted information support care should be launched. Information supporting care can alleviate the negative emotions of patients, promoted understanding, and increased trust between doctors and patients [9]. Information supporting care can help patients know diseases, increase their enthusiasm and promote their disease management ability [10]. Therefore, for the BSID-CR test process, medical staffs should strengthen the support of BSID-CR test information to promote effective cooperation between parents and BSID-CR testers to ensure test quality.

The BSID-CR clinical test training system and their scheduling system need to be improved. Medical quality is the foundation for the survival and development of hospitals. Improving medical standards and ensuring medical safety are the key to the survival and development of hospitals [11,12]. From the interview results of the Theme2, the training of the testees was not enough. The training of BSID-CR clinical test had a higher correlation with medical quality and technical level [13]. Improving the medical treatment technology level and medical quality through training can effectively improve the patient's trust. Effective training can improve the medical technology level [14,15]. It is recommended to improve the medical treatment technology level of BSID-CR testers by organizing regular professional training. The interview results of the Theme2 also showed that the scheduling system can be optimized. At the peak of the medical visit, the workload of outpatient medical staff had also increased dramatically [16], which will seriously affect the quality of outpatient work. The quality development and improvement of hospitals cannot be separated from the rational allocation of management positions by management [17]. The author believed that the intensity of changes in the patients' flow and the daily workload can be combined to avoid empirical scheduling and rationally optimize the scheduling system.

The environmental preparation was insufficient in the Intelligence Test room. Through the analysis of Theme2 interview result, the environment of the Intelligence Test room had an impact on the quality of the BSID-CR test. The environmental readiness was positively correlated with the degree of infant's cooperation during BSID-CR test. That is to say, the environmental preparation of the Intelligence Test room was prepared according to the characteristics of the physical and mental development of infants, and the better the degree of cooperation in the test process, the quality of the test was further ensured. In the study of Zhang et al. [18] also suggested that infants and toddlers would have anxiety. And anxiety about the environment may even not cooperate with the inspection of BSID-CR testers, resulting in unqualified inspection quality or failure of inspection. Therefore, it is recommended that the environment be prepared to be suitable for temperature and humidity [19]. Adequate lighting and reasonable layout can help eliminate discomfort in infants and toddlers [20]. Taking the physiological and psychological characteristics of infants and toddlers as the starting point for the layout environment, the walls of the Intelligence Test room advocated sticking colorful, vivid and interesting cartoon paintings.

BSID-CR needs to be optimized. On one hand, the description of the BSID-CR operation guide for some test items was vague and ambiguous. From the interview results of Theme4, the BSID-CR testers said the description of the operation guide for some test items was not accurate enough. The researchers suggested academicians can compare the BSID-CR operation manual with the original BSIDII operation manual to find out the ambiguity part and further explore the revision study of the BSID-CR scale. On the other hand, BSID-CR Test tools’ design elements affect BSID-CR test. From the interview results of Theme4, Some test tools (such as the pulling tool small yellow duck) distract the testee's attention, prolong the test time, cause the testees to be irritated, and even cause the motor test to be terminated, which seriously affects the quality of the test. Studies had also suggested that different colors can affect the psychology of infants and toddlers to varying degrees [20]. For infants and toddlers, the color that is preferred or good-looking can increase the balance and coordination of infants and toddlers [21]. From this point of view, whether the black and white test pictures, brightly colored small yellow duck traction tools will affect the interest of the infants in the test remains to be further studied. When using the "Boken Head toll" test tool designed in the European
court style, this test items have a low test pass rate or a test time significantly longer than other test items. Can they be further improved based on the characteristics of domestic infants and toddlers? For example, the design of "Boken Head toll" can appropriately enlarge the size of the doll and make the limbs clearer.

The necessity of BSID-CR clinical test to carry out nursing quality management work and strengthen quality control measures.

Combining the investigator's on-site observation, clinical testing experience, BSID-CR tester and testees' parental interview results analysis, at present, the BSID-CR clinical test still had a long test time (average 45 min, a few up to 90 min), the operation and test results are complicated to analyze and the testees' attention was short-lived and susceptible. There are many factors influencing the measurement of BSID-CR. Moreover, the BSID-CR testers are medical staff (doctor, nurse or therapist) professional trained by the BSID-CR test training center, so it is necessary to conduct further quality control research from the perspective of nursing quality management.

The results also suggested that some quality management methods can be used to carry out targeted quality control. For example, based on parents' cognition of BSID-CR test currently, Medical staff can produce an easy-to-understand health education manual or Receiving medical staff strengthen relevant medical information education to improve the information support care. Taking the PDCA cycle as the research design idea, managers can carry out the corresponding quality control circle activities, maintain and promote the quality level of this kind of medical diagnosis and treatment process, establish a three-level quality control mode to promote the standardization of the tester test, and strengthen the quality supervision. It is suggested that the managers disperse the work intensity by expanding the scheduled mode of the BSID-CR test. The author believe it is meaningful to improve the quality of test by strengthening quality supervision.

REFERENCES