Prechemotherapy nursing assessment among adult cancer patients in a university cancer center in Shanghai, China: a best practice implementation project

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ABSTRACT

Objective: The current implementation project aimed to promote evidence-based practice with prechemotherapy nursing assessment among adult cancer patients in a large university cancer center in Shanghai, China, over a 6-month timeframe.

Introduction: Prechemotherapy nursing assessment is an essential element of cancer patient care, aiming to prevent or minimize potential problems from chemotherapy treatment. Regular comprehensive prechemotherapy assessment is not part of routine care currently in many clinical settings within China.

Methods: The project utilized the JBI’s approach to implementation, incorporating audit and feedback tools. Twelve evidence-based audit criteria were developed for use in the program. A baseline audit was conducted of prechemotherapy nursing assessment among adult cancer patients, with a sample size of 68 patients and 36 nursing staff. Following implementation of systematic strategies based on the analysis of three main barriers, a follow-up audit involving a similar sample as the first audit was conducted using the same audit criteria.

Results: The baseline audit indicated that for nursing assessment among adult cancer patients undergoing chemotherapy, the criteria (1, 10, 11 and 12) which related to nurse education, weight measurement, premedication and access device assessment had very high compliance (from 93 to 100%). Compliance for criteria (2, 6, 7, 9) related to medical history, previous exposure to chemotherapy, patients’ or caregivers’ comprehension of treatment and psychosocial assessment was 0%, while compliance with the other five criteria (3, 4, 5, 8) was low, ranging from 16 to 61%. There was improvement in all 12 criteria in the follow-up audit. Criteria 1, 11 and 12 maintained high compliance (100%). Criterion 2 (patients’ medical history), criterion 3 (presence or absence of allergies), criterion 7 (previous exposure to chemotherapy) and criterion 9 (psychosocial elements) demonstrated a significant improvement in compliance. Although progress has been made, there were still some criteria that require further improvement. These included assessment of patients’ current diagnosis and cancer status (criterion 4, from 61 to 66%), recent laboratory results (criterion 5, from 31 to 62%), patients’ and/or caregivers’ comprehension of information regarding the disease and treatment (criterion 6, from 0 to 34%), any previous exposure to chemotherapy agents (criterion 7, from 0 to 57%), and physical assessment of the patient (criterion 8, from 46 to 72%).

Conclusion: The project achieved increased compliance with evidence-based best practice in all assessed audit criteria improving the practice of prechemotherapy assessment. Involvement of informatics technology is a great strategy to help overcome barriers, simplify the change process and assist in sustaining evidence-based practice change. Future plans and ideas are in place and have been discussed. Further audits will need to be carried out to improve the validity and quality of nursing assessment.

Key words: evidence-based practice, nursing assessment, prechemotherapy


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Introduction

Despite rapid advances in other treatment strategies, chemotherapy plays an integral role in the treatment of cancer and it remains a mainstay treatment modality for many solid and hematological tumors.\(^1\) Given the high potential for harm from chemotherapy agents and the potential consequences of incorrect administration, it is important that chemotherapy is administered appropriately to optimize safety and treatment response. According to consensus-based standards from the Canadian Association of Nurses in Oncology, the updated American Society of Clinical Oncology/Oncology Nursing Society chemotherapy administration safety standards and guidelines from the Clinical Oncological Society of Australia, nurses should conduct and document comprehensive health assessments at the onset of cancer chemotherapy and throughout the cancer care continuum.\(^2,\text{-}5\) The recommendation is that prechemotherapy nursing assessment is an essential element of cancer patient care.\(^6\) Actual and/or potential problems associated with cytotoxic drugs may be prevented or minimized when nursing interventions are based on an accurate and systematic patient assessment.\(^2,\text{-}6\) Accurate patient assessment is the cornerstone of clinical judgment and decision-making, and is crucial for the provision of high-quality, safe, patient-centered care, with assessment considered to be an essential role of the nurse.\(^1\)

Assessment is the element of the nursing process upon which all other process components are based. Within the context of patients receiving chemotherapy, assessment is necessary for the evolution of nursing strategies, which will predict, prevent or minimize treatment sequelae. Frequently in China, decisions regarding chemotherapy administration are based solely upon physician assessment including physical condition, blood testing, medications etc., often lacking the psychological and cognitive dimensions that are an integral part of nursing assessment.\(^7,\text{-}8\) In addition, patients often discuss with their nurse signs and symptoms that they did not report to the physician. Furthermore, as duration of hospitalization becomes shorter, access to physicians may be limited. Ellis reported that from patients’ perspectives, a combined medical and nursing approach is worthwhile in preparing patients for cytotoxic chemotherapy.\(^9,\text{-}10\) Hence, a systematic nursing assessment will complement the physician’s pretreatment evaluation of patients receiving chemotherapy.\(^10\) Accordingly, best practice recommendations suggest that pretreatment assessment of patients undergoing chemotherapy is strongly recommended.

The following best practice recommendations were formulated based on an evidence summary of international research developed by the JBI.\(^6\) This followed the JBI methodology and was proposed at the onset of this implementation project.\(^11\)

1. A comprehensive patient assessment should be conducted and documented prior to administering chemotherapy. (Grade A)
2. The assessment should cover the patient’s medical history, including presence or absence of allergies, previous exposure to chemotherapy agents, current diagnosis and cancer status, and recent laboratory results. (Grade B)
3. Nurses should assess that patients and/or caregivers have understood information regarding the disease and treatment plan. (Grade B)
4. Physical and psychosocial assessment of the patient should be conducted. (Grade B)
5. The patient’s weight and BSA should be measured and the impact on chemotherapy dose assessed. (Grade B)
6. Premedication requirements should be assessed. (Grade B)
7. Any access device required for chemotherapy administration should be assessed. (Grade B)

The current project was conducted at a large university cancer center in Shanghai, which is one of the leading academic public cancer centers in China. The two medical departments where the data were collected provide intravenous chemotherapy for inpatients. Each ward has 20 nursing staff and 60 beds. The average number of patients receiving chemotherapy is 40/day, with days of hospitalization for each cycle being 2–3
days on average. Every clinical nurse is assigned 10–15 beds during the day shift. The medical team will assess whether a patient is appropriate for chemotherapy, according to their physical assessment and other objective medical tests. On admission, an assessment focused on physical evaluation including vital signs, weight, function, nutrition, symptoms such as pain and the condition of the central vascular access device will be conducted by nursing staff. According to best practice recommendations, the regular prechemotherapy assessment is not part of routine practice, nor is it comprehensive.

Aim and objectives
This project aimed to conduct a clinical audit to evaluate compliance with best practice in prechemotherapy nursing assessment for adult cancer patients, and implementation of evidence-based practices recommended by JBI, using the audit and feedback strategy to promote healthcare change.

Objectives
(1) To identify and engage a multidisciplinary team for promoting evidence-based practice in the assessment of patients prior to chemotherapy, and assess compliance with best practice using a baseline audit and an audit tool developed by JBI.
(2) To reflect on the results from the baseline audit, and design and implement strategies to address areas of noncompliance with best practice in the assessment of patients undergoing chemotherapy.
(3) To undertake a follow-up audit, assessing the extent and nature of increased compliance with evidence-based best practice, identifying areas and strategies to sustain and enhance care in the ongoing delivery of nursing assessment to patients prior to chemotherapy.

Methods
This evidence implementation project utilized the JBI Practical Application of Clinical Evidence System (PACES) and Getting Research into Practice (GRiP) audit and feedback tool, and was conducted over a 6-month period from May to October, 2018. The PACES and GRiP framework for promoting evidence-based healthcare involved three phases of activity:

Phase 1: Developing a project plan
Team establishment
A project team was established, which consisted of three directors of the nursing department, senior nurses responsible for the two target departments and the project leader. The project leader was responsible for the promotion of the project and instigating each stage of the process. The other project team members were responsible for data collection, providing feedback and implementation of strategies. Both senior nurses, as project team members, provided support and welcomed the author to conduct observational audits of nurses during their clinical practices. Many project team meetings were held to tailor and detail the criteria based on clinical practice, and identify the sampling methods for each criterion.

Baseline audit
Prior to this implementation project, the JBI database did not contain an evidence summary specific to prechemotherapy patient assessment. In collaboration with JBI research staff and the project team lead, evidence-based audit criteria were developed and piloted based on research literature. Twelve evidence-based audit criteria for assessing patients prior to chemotherapy were developed, and uploaded for access through the JBI PACES online program. Table 1 details the JBI evidence-informed audit criteria used in the project (in both baseline and follow-up audit) together with a description of the sample and approach to measuring compliance with best practice for each audit criterion.

The baseline audit was conducted over 1 month from May to June 2018, with data collection conducted through interview with nursing staff and medical record review. Sample size was achieved with convenience sampling of 68 patients and 36 nurses. The PACES report of the baseline audit findings (Fig. 1) is displayed in the results section.

Phase 2: Design and implementation of strategies to improve practice (Getting Research into Practice)
The project team reviewed the baseline audit findings with key stakeholders, guided by the GRiP framework, and brainstormed barriers preventing best practice delivery using various methods (such as fishbone analyses). Aspects of clinical performance that needed developing were identified, and strategies devised to improve clinical care.

Phase 3: Follow-up audit post implementation of change strategy
Phase 3 included the postimplementation audit and comparative review of the audit data. Similar to the baseline audit, the review process involved the project team review of findings, and identifying strategies that
### Table 1. Audit criteria and audit guide

<table>
<thead>
<tr>
<th>Audit criterion</th>
<th>Sample</th>
<th>Method used to measure % compliance with best practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nurses have received education regarding assessment of patients prior to chemotherapy</td>
<td>Baseline audit sample: 36 nurses Follow-up audit sample: 36 nurses</td>
<td>Data collected via questionnaire of nursing staff Yes, if nursing staff had previous education regarding assessment Review documentation including admission evaluation form, falls evaluation form and chemotherapy nursing recording form</td>
</tr>
<tr>
<td>2. The patient's medical history has been checked</td>
<td>Baseline audit sample: 68 medical record observations Follow-up audit sample: 68 medical record observations</td>
<td>Yes, if medical treatment history, and compliance, have been documented Review documentation including admission evaluation form and chemotherapy nursing record form</td>
</tr>
<tr>
<td>3. Presence or absence of allergies has been checked</td>
<td>Baseline audit sample: 68 medical record observations Follow-up audit sample: 68 observations</td>
<td>Yes, if medication allergies have been documented in medical records Data collected by interview with clinical nurses Yes, if nurse responsible for the patient was able to review the patient's diagnosis and cancer status correctly</td>
</tr>
<tr>
<td>4. The patient's current diagnosis and cancer status has been checked</td>
<td>Baseline audit sample: 61 observations Follow-up audit sample: 68 observations</td>
<td>Data collected by interview with clinical nurses Yes, if nurse responsible for the patient was able to review the patient's blood counts correctly</td>
</tr>
<tr>
<td>5. Recent laboratory results have been checked</td>
<td>Baseline audit sample: 68 observations Follow-up audit sample: 68 observations</td>
<td>Data collected by interview with clinical nurses Yes, if nurse responsible for the patient was able to review the patient's diagnosis and cancer status correctly</td>
</tr>
<tr>
<td>6. The patient's and/or caregiver's comprehension of information regarding the disease and treatment plan has been assessed</td>
<td>Baseline audit sample: 68 observations Follow-up audit sample: 68 observations</td>
<td>Yes, if the patient's and/or caregiver's comprehension of information regarding the disease and treatment plan had been documented</td>
</tr>
<tr>
<td>7. Any previous exposure to chemotherapy agents has been assessed, including previous treatment response and previous toxicities</td>
<td>Baseline audit sample: 68 observations Follow-up audit sample: 68 observations</td>
<td>Review documentation (all related nursing recordings) Yes, if any previous exposure to chemotherapy agents has been documented, including previous treatment response and previous toxicities</td>
</tr>
<tr>
<td>8. Physical assessment of the patient has been conducted, including functional status and/or performance status, symptom assessment, and vital signs</td>
<td>Baseline audit sample: 68 observations Follow-up audit sample: 68 observations</td>
<td>Review documentation (vital sign observation forms, Barthel assessment form) Yes, if there is documentation regarding the functional status and symptoms within 1 week before chemotherapy, and vital signs on the day of chemotherapy</td>
</tr>
<tr>
<td>9. Psychosocial assessment of the patient has been conducted and support needs identified</td>
<td>Baseline audit sample: 68 observations Follow-up audit sample: 68 observations</td>
<td>Review documentation Yes, if there has been an assessment of the patient's psychosocial status documented, and support needs identified</td>
</tr>
<tr>
<td>10. The patient's weight and BSA have been measured and the impact on chemotherapy dose assessed</td>
<td>Baseline audit sample: 68 observations Follow-up audit sample: 68 observations</td>
<td>Review documentation Yes, if the patient's weight has been measured and documented, and reviewed accordingly</td>
</tr>
<tr>
<td>11. Premedication requirements have been assessed</td>
<td>Baseline audit sample: 68 observations Follow-up audit sample: 68 observations</td>
<td>Review documentation Yes, if medication orders were administered correctly and in a timely manner</td>
</tr>
<tr>
<td>12. Assessment of access device required for chemotherapy administration has been conducted</td>
<td>Baseline audit sample: 68 observations Follow-up audit sample: 68 observations</td>
<td>Review documentation Yes, if the access device has been assessed and documented</td>
</tr>
</tbody>
</table>
were successful and those that required revision. One objective of the audit process was to have the project team in phase 3 take ownership of the project, and have the project integrated into the current quality improvement activities undertaken within the unit. The sample included patients who were undergoing chemotherapy. There were 68 patients and 36 nurses involved in the baseline audit, with a similar number involved in the follow-up audit.

Ethical considerations
This implementation project was registered as a quality improvement activity within the hospital and therefore did not require ethical approval from the Institutional Review Board.

Results
Phase 1: Baseline audit
The baseline audit was conducted over 1 month, including 68 patients and 36 nursing staff in the baseline audit. The baseline audit results (Fig. 1) highlighted that for criteria 1, 10, 11 and 12, which related to nursing training, weight measurement, premedication and access device assessment had very high compliance (from 93 to 100%), in line with the best practice recommendations. Compliance with criteria 2, 6, 7, 9, which related to medical

Criteria Legend

1. Nurses have received education regarding assessment of patients prior to chemotherapy. (36 of 36 samples taken)
2. The patient’s medical history has been checked. (68 of 68 samples taken)
3. Presence or absence of allergies has been checked. (68 of 68 samples taken)
4. The patient’s current diagnosis and cancer status has been checked. (61 of 61 samples taken)
5. Recent laboratory results have been checked. (61 of 61 samples taken)
6. The patient’s and or caregiver’s comprehension of information regarding the disease and treatment plan has been assessed. (68 of 68 samples taken)
7. Any previous exposure to chemotherapy agents has been assessed, including previous treatment response and previous toxicities. (68 of 68 samples taken)
8. Physical assessment of the patient has been conducted, including functional status and/or performance status, symptom assessment, and vital signs. (68 of 68 samples taken)
9. Psychosocial assessment of the patient has been conducted and support needs identified. (68 of 68 samples taken)
10. The patient’s weight and body surface area have been measured and the impact on chemotherapy dose assessed. (68 of 68 samples taken)
11. Pre-medication requirements have been assessed. (68 of 68 samples taken)
12. Assessment of access device required for chemotherapy administration has been conducted. (68 of 68 samples taken)

Figure 1. Baseline compliance with best practice for audit criteria (%).
history, previous exposure to chemotherapy, patients’ or caregivers’ comprehension of treatment and psychosocial assessment was 0%, with evaluation of 68 medical records. Compliance with the other five criteria (3, 4, 5, 8) was relatively low, ranging from 16 to 61%.

**Phase 2: Strategies for Getting Research into Practice**

The project team analyzed the results of the baseline audit, guided by the GRiP framework, brainstorming barriers to best practice delivery using the fishbone analysis method. We identified three main barriers to best practice and determined strategies designed to overcome them (summarized in Table 2), incorporating:

**Barrier 1: Inadequate prechemotherapy nursing assessment awareness and knowledge for nursing staff.**

**Strategies:**

Lectures on prechemotherapy nursing assessment were developed as a 40-min session, covering the importance of prechemotherapy nursing evaluation and best practice based on available evidence. The research team also conducted individualized education for nurses about the implementation of nursing assessment and recording methods. All of the staff nurses were regularly organized to review assessment detailed information like symptom assessment, function checking of vascular access and so on. The nurse lead for each department conducted spot examinations, which hoped to motivate staff to actively review the related knowledge and reinforce the impact of the training. All improvements were implemented step by step, with a small number of nurses involved in the early stages gradually influencing the majority of nurses during the process.

**Barrier 2: Prechemotherapy evaluation content and related policies needed to be improved.**

**Strategies:**

The electronic documentation system and evaluation forms for the nursing process were updated to optimize the work of the team, with information based on best practice and consistent with the lectures. The assessment of previous exposure of chemotherapy including previous treatment response and previous toxicities (criterion 7 and criterion 3) were designed according to the related references, and included in the electronic admission nursing documentation system, with similar measures taken for treatment history for criterion 2. With criterion 6, regarding chemotherapy cycle and interval, these were added into the prechemotherapy section of the nursing education form, for which the nurse was required to complete the related education and

**Table 2. Getting Research into Practice matrix**

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Strategies</th>
<th>Resources</th>
<th>Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate prechemotherapy nursing assessment awareness and knowledge for nursing staff</td>
<td>Group training about the importance of assessment and related contents</td>
<td>Training materials</td>
<td>All nurses received education and training on importance and knowledge of prechemotherapy nursing assessment (36 nursing staff) Nurses improved their level of knowledge Improved follow-up audit results for criterion 1 Improved prechemotherapy evaluation content and related policies Improved follow-up audit results for criteria 2,3,5,6,7,9</td>
</tr>
<tr>
<td>Lack of integrated prechemotherapy evaluation content and related policies</td>
<td>Improve previous evaluation forms</td>
<td>Previous evaluation forms</td>
<td></td>
</tr>
<tr>
<td>Lack of time to conduct comprehensive assessment before chemotherapy</td>
<td>Simplify evaluation practices</td>
<td>Technology support from IT coworkers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Utilize patient self-report assessment form</td>
<td>Support from head nurse and nursing department</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Add memorize function for nursing electronic evaluation system, and developed the assessment function for electronic nursing Pad</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Make symptom assessment grading card in different forms for nurses</td>
<td></td>
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</tbody>
</table>
document its effect with patient feedback before the administration of chemotherapy. Evaluation of depression and anxiety, the most common psychosocial elements (criterion 9), were added into nursing forms, and required to complete the related assessment and record the results when the patient was admitted to hospital.

Improvements were made to the institutional pre-chemotherapy evaluation policies in line with best practice recommendations. Training covered these new evaluation forms and assessment frequency requirements for physical assessment (criterion 8) and weight measurement (criterion 10), which was at least once per week.

Further nursing supervision was provided to ensure nurses were practicing according to the new policies, especially assessment frequency.

 Barrier 3: Time required by nursing staff to conduct comprehensive assessment prior to chemotherapy.

Strategies:

Evaluation practices were simplified, with evaluation forms designed as multiple-choice questions, which were easier to complete. Combining nurse-led assessment with patient self-report symptom assessment forms required patients to fill out forms and report any symptoms prior to admission. Another important measure is to develop the memory function of the nursing electronic information system, which automatically records the basic information that is unlikely to change between two cycles of chemotherapy, thereby reducing the nurse’s recording burden. The nurse only needs to update this information if necessary. The research team also developed symptom grading cards in different formats, which nurses were able to use either at the bedside, or keep in their pocket, enabling a convenient way for checking the degrees of symptoms.

Phase 3: Follow-up audit post implementation of change strategy

The postimplementation audit was conducted over 1 week, in the same way as the baseline audit, with 36 nursing staff and 68 patients involved. Compliance for each audit criterion from the follow-up audit in comparison with the baseline audit are shown in Fig. 2 and Table 3. From the results, criteria 1, 11 and 12 maintained high compliance (100%). Criterion 2 (patients’ medical history), criterion 3 (presence or absence of allergies), criterion 7 (previous exposure to chemotherapy) and criterion 9 (psychosocial elements) demonstrated a significant improvement in compliance (P = 0.000). Although much progress has been made, some criteria require further improvement, including assessment of patients’ current diagnosis and cancer status (criterion 4, from 61 to 66%), recent laboratory results (criterion 5 from 31 to 62%), the patients’ and or caregivers’ comprehension of information regarding the disease and treatment (criterion 6, from 0 to 34%), any previous exposure to chemotherapy agents (criterion 7, from 0 to 57%), and physical assessment of the patient (criterion 8, from 46 to 72%).

Discussion

The current implementation project has achieved many improvements in compliance with the best available evidence for prechemotherapy nursing assessment. From the initial audit, for most of the evaluated 12 criteria, a low level of compliance was observed. For the criterion directly affecting chemotherapy administration, compliance was relatively high, including weight measurement, premedication and vascular access assessment. However, nursing staff and the organizational evaluation protocols often disregard assessments of patients’ previous experience (previous exposure to chemotherapy and treatment history) and psychosocial elements. Once the chemotherapy is completed, patients return home until the next cycle, and most of the side effects will happen during these treatment intervals. It is therefore very important to assess these previous side effects that occur at home between cycles. Patients receiving chemotherapy may experience issues that affect their psychological, emotional and/or social wellbeing, which in turn may affect the next round of chemotherapy. Evidence highlights that patients should be treated as a ‘whole person’, not just as a set of physical symptoms. Other criteria relating to the patients’ and or caregivers’ comprehension of information regarding the disease and treatment plan had 0% compliance. However, the zero compliance didn’t necessarily mean that clinical nurses did not give education in this area; however, the education provided mainly focused on information such as the chemotherapy medication and its potential adverse reaction, but missed information about treatment plans including number of cycles, interval days and so on. The project team analyzed the main reasons for poor compliance. Three barriers were identified, including: inadequate awareness and knowledge of the nursing staff; imperfect organizational nursing evaluation including electronic recording systems and forms; and lack of time to conduct such systematic assessment. The main actions undertaken by the coordinating group were a training program for the nursing staff, improvement for the nursing prechemotherapy evaluation policy and simplified evaluation practices. The results of the follow-up audit demonstrated that compliance for most criteria had improved when evidence-based recommendations were implemented.
The introduction of nursing electronic records was an important strategy, making the implementation process easier, and ensuring the sustainability while embedding practices into routine daily workflows. During this project, the electronic nursing documentation system was updated both in content and function with information based on best practice and consistent with the education sessions, and assessment was further enhanced with the use of a mobile tablet. Nurses were able to complete evaluations easily with multiple choice questions without place and time restriction, and no repeat assessments were required due to the increased memory function of the electronic nursing documentation system. Health information tools can increase

**Criteria Legend**

1. Nurses have received education regarding assessment of patients prior to chemotherapy. (36 of 36 samples taken)
2. The patient’s medical history has been checked. (68 of 68 samples taken)
3. Presence or absence of allergies has been checked. (68 of 68 samples taken)
4. The patient’s current diagnosis and cancer status has been checked. (61 of 61 samples taken)
5. Recent laboratory results have been checked. (61 of 61 samples taken)
6. The patient’s and or caregiver’s comprehension of information regarding the disease and treatment plan has been assessed. (68 of 68 samples taken)
7. Any previous exposure to chemotherapy agents has been assessed, including previous treatment response and previous toxicities. (68 of 68 samples taken)
8. Physical assessment of the patient has been conducted, including functional status and/or performance status, symptom assessment, and vital signs. (68 of 68 samples taken)
9. Psychosocial assessment of the patient has been conducted and support needs identified. (68 of 68 samples taken)
10. The patient’s weight and body surface area have been measured and the impact on chemotherapy dose assessed. (68 of 68 samples taken)
11. Pre-medication requirements have been assessed. (68 of 68 samples taken)
12. Assessment of access device required for chemotherapy administration has been conducted. (68 of 68 samples taken)

**Figure 2.** Compliance with best practice for audit criteria in follow-up audit compared with baseline audit (%).
nurses’ efficiency, improve documentation and communication between health professionals, which can reduce the time nurses spend on these aspects therefore releasing time for other aspects of nursing care provision; besides, electronic documentation is also more legible.\textsuperscript{13–15} In addition to the improvement of electronic recording system, other integrations of the new evidences with existing nursing processes help to sustain the implementation of evidence, including the improvement of nursing education sheet and nursing recording form.

The great support from nursing department and head nurses of target departments were essential during the implementation of this project. As can be seen from the follow-up results, many criteria (including criteria 4–8) highlighted that compliance with best practice was less than 75%. A second action cycle is recommended in the future to further improve compliance. For the assessment of patients’ diagnosis (criteria 4) and lab results (criteria 5), the main possible barriers were the replacement of charge nurse, and the time difference between admission and chemotherapy. As to criterion 7, the main reason for the low compliance was the invalidity of assessment, which mainly referred to the inconsistence between medical records and nursing evaluation recording. So, further improvement needs to ensure validity of nursing assessment, because of the limited compliance measurement method, which focused on medical records and lacked real-time quality control. Supervision needs to be strengthened to ensure some physical assessment including function, and weight to be assessed at least once a week, to increase the compliance of criterion 8 and criterion 10.

The JBI PACES and GRIP framework is a good model for clinical nurses to implement and promote evidence-based practice. In China generally, clinical nurses who have strong executive support often lack evaluation awareness and competence. Thus, it is vital to strengthen education to enhance the assessment skills and knowledge, and this kind of targeted education can start with new nurse’s orientation programs and be carried out continuously. Second, it is also significant to optimize organizational systems to assist nurses in completing assessments efficiently, as in the introduction of information technology and even artificial intelligence.

### Conclusion

The aims and objectives of the project were fulfilled. Increased compliance with evidence-based best practice recommended by JBI was achieved in all assessed audit criteria, highlighting improved nursing assessment practices. Informatics technology involvement is a great strategy to help overcome barriers, simplify the changing process and sustain evidence-based practice change. Future plans and ideas are in place and have been discussed. Further audit will need to be carried out to improve the validity and quality of nursing assessment.

#### Table 3. Compliance with best practice for audit criteria in follow-up audit compared with baseline audit (%)

<table>
<thead>
<tr>
<th>Audit criteria</th>
<th>Baseline</th>
<th>Follow-up</th>
<th>Chi-square value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Nurses have received education regarding assessment of patients prior to chemotherapy (n = 36)</td>
<td>33 3 36 0</td>
<td>3.13 0.070</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. The patient’s medical history has been checked (n = 68)</td>
<td>0 68 66 2</td>
<td>128.23 0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Presence or absence of allergies has been checked (n = 68)</td>
<td>11 57 67 1</td>
<td>94.27 0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. The patient’s current diagnosis and cancer status has been checked (n = 61)</td>
<td>37 24 40 21</td>
<td>0.32 0.573</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Recent laboratory results have been checked (n = 61)</td>
<td>19 42 38 23</td>
<td>11.89 0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. The patient’s and/or caregiver’s comprehension of information regarding the disease and treatment plan has been assessed (n = 68)</td>
<td>0 68 23 45</td>
<td>27.68 0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Any previous exposure to chemotherapy agents has been assessed, including previous treatment response and previous toxicities (n = 68)</td>
<td>0 68 39 29</td>
<td>54.68 0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Physical assessment of the patient has been conducted, including functional status and/or performance status, symptom assessment, and vital signs (n = 68)</td>
<td>31 37 49 19</td>
<td>9.84 0.002</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Psychosocial assessment of the patient has been conducted and support needs identified (n = 68)</td>
<td>0 68 67 1</td>
<td>132.06 0.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. The patient’s weight and BSA have been measured and the impact on chemotherapy dose assessed (n = 68)</td>
<td>63 5 64 4</td>
<td>0.12 0.730</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Premedication requirements have been assessed (n = 68)</td>
<td>68 0 68 0</td>
<td>– –</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Assessment of access device required for chemotherapy administration has been conducted (n = 68)</td>
<td>68 0 68 0</td>
<td>– –</td>
<td></td>
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</tr>
</tbody>
</table>
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Conflicts of interest
The authors report that there are no conflicts of interest.

References