Exploring elderly patient’s experience and concerns of early ambulation implemented in postoperative care following lumbar spinal surgery: a qualitative study

Jie Huang (huangjie_831106@sina.com)  
Beijing Jishuitan Hospital

Pan Li  
Beijing Jishuitan Hospital

Huiting Wang  
Beijing Jishuitan Hospital

Chenxi Lv  
Beijing Jishuitan Hospital

Jing Han  
Xuzhou Medical University

Xuemei Lu  
Beijing Jishuitan Hospital

Research Article

Keywords: early ambulation, elderly, lumbar, education, pain management

Posted Date: February 16th, 2023

DOI: https://doi.org/10.21203/rs.3.rs-2545110/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License

Version of Record: A version of this preprint was published at BMC Nursing on October 4th, 2023. See the published version at https://doi.org/10.1186/s12912-023-01510-7.
Abstract

**Background:** Given the apparent benefits, the implementation of early ambulation is becoming increasingly important in spinal surgery. The timing for patients first time get out of bed for ambulation after spinal surgery has a wide range. Since Jan 2022, we conducted a study of early ambulation (ambulated within 4h postoperatively) in elderly patients following long-segments lumbar decompression and fusion surgery. In order to better understand elderly patients’ perceptions of the early ambulation, clarify controversies, and ultimately contribute to the improvement of elderly patients’ perioperative experience and also the quality of life, we carried out this qualitative approach.

**Methods:** A qualitative description design with face-to-face semi-structured interviews was used. Twenty-four patients were enrolled in participating and completing this qualitative investigation from February to June 2022. Interviews were audio-recorded, and content analysis was used for data analysis.

**Results:** Six themes were identified from this study about patient’s experience and concerns on early ambulation: Worries, Benefits, Daily Routines, Pain, Education and Supports. The findings showed the obstacles in early ambulation practice and highlighted the importance of education on early ambulation in the perioperative hospitalization.

**Conclusions:** Unequivocal guidance for early ambulation and multidisciplinary ambulation protocol, including comprehensive pain management plan are essential to induce patient education, which may have positive effects on reducing stress and getting rid of anxiety for postoperative early ambulation.

**Background**

The concept of early ambulation is large, complex, and interdisciplinary. It consists of both physical and psychological aspects(1), and generally defined as the patient getting out of bed as soon as possible after surgery. In recent years, early ambulation has been strongly recommended as part of enhanced recovery after orthopaedic surgery(2). Clinical practice guideline issued by the American Association of Neuroscience Nurses (AANN) recommends that orthopaedic patients should mobilize quickly after spinal surgery unless complication or ordered differently(3).

Immobilization or bed rest after the orthopaedic surgical procedure has been demonstrated to be accompanied with problems such as urinary tract infections, pneumonia and venous thromboembolism which are potentially lethal complications(4, 5). Early ambulation is safe, feasible, and has positive results, which lead to a shorter length of stay, little healthcare costs and lower complication rate(6, 7). Furthermore, early ambulation could improve not only patient experiences such as pain, but also the performance-based function and patient satisfaction(8–10).

Early ambulation protocols have been successfully established and applied, and have shown promising results. In a study which enrolled a total of 406 consecutive patients following total knee arthroplasty, found that early ambulation could help reduce the length of stay, decrease postoperative complications,
and improve functional outcomes(11). Another study enrolled 240 patients undergoing hip fracture surgery illustrated early ambulation was as safe as delayed mobilization in complication rate, and indicated early ambulation could help to reduce the postoperative length of stay and financial costs(12). Additional, in a pilot study conducted in a Surgical/Trauma ICU in the Southeastern United States, the researcher applied their mobility protocol comprised of 6 activity events for mechanically ventilated patients, and the results showed stable vital signs and no extubation or line removal events in the patients, additionally less length of stay values than the average(13).

Given the apparent benefits of early ambulation in orthopaedic surgery, it is not surprising that its implementation in spinal surgery is becoming increasingly common. Decompression and fusion surgery under general anaesthesia is an effective treatment for degenerative, traumatic, and oncological pathologies of spine(14). In a randomized controlled study reported by Qvarfordh et al., early ambulation after lumbar discectomy surgery benefited patients in fewer painkillers and less oxygen supplement during the first postoperative day(15). In the study of Adogwa et al. conducted of 125 elderly patients undergoing surgery for correction of adult degenerative scoliosis of spine, they thought early ambulation was helpful for decreasing not only length of hospital stay, but also perioperative complications, and improving functional outcomes(6). Our study team found that early ambulation in elderly patients undergoing lumbar decompression and fusion surgery contributes to improved patients’ postoperative functional status, decreased the incidence of complications, and shortened postoperative hospital stay(16). Additionally, results in a study conducted by Weerink et al. suggested that early ambulation was successful and safe alternative compared to immobilization in nonoperative treatment of elderly patients with spinal fracture involving both middle and anterior columns, based on the advantage that early ambulation did not lead to new complications or neurological damage(17).

The concept of early ambulation after spinal surgery is widely accepted and demonstrated its benefits. However, there are still obstacles in the application in actual clinical practice. Given the fact that patients come from different countries and regions, the size and diversity of patients and the number of health care providers involved in their medical care, meanwhile no specific recommendations available for the evidence that how soon should the patients get out of bed for ambulation, there is a wide range of times for patients first time get out of bed for ambulation after spinal surgery. It ranges from a few hours to several days and even weeks. The decisions from surgeons and nurses are also crucial, which are based on the surgical techniques and traditions in nursing practice.

We conducted a study of early ambulation in elderly patients following long-segments lumbar decompression and fusion surgery since Jan 2022 (ClinicalTrials.gov ID: NCT04133103), the patients in early ambulation group could ambulated within 4 h postoperatively. In order to better understand elderly patients’ perceptions of the early ambulation after long-segments lumbar decompression and fusion surgery, clarify controversies, and ultimately contribute to the improvement of elderly patients’ perioperative experience and also the quality of life, qualitative approaches should be considered. The insights of patients may generate new information on strategies to the clinical practice of early ambulation after spinal surgery. The aim of this current research is to gain a rich and more in-depth
understanding of the elderly patient's experience and concerns of early ambulation following long-segments lumbar decompression and fusion surgery.

**Methods**

**Aim and Design**

This study is a qualitative investigation based on phenomenological research, using semi-structured interviews focused on the elderly patients’ experience and concerns on early ambulation after long-segments lumbar decompression and fusion surgery.

**Setting and participants**

This study was conducted in the National Center for Orthopaedics in China, which is an over 1,700-bed academic medical center. This center has a 120-bed spine unit and is located in the center of Beijing, China. It is one of the best spine units in China and performs on average 4,000 spinal surgeries annually. Patients in this center were come from all over the country.

Patients undergoing lumbar decompression and fusion surgery at spine unit were invited to participate in the current qualitative investigation. The inclusion criteria were willingness to join this study, the ability to share his/her ideas, aged 60 years or older, and following long-segments lumbar decompression and fusion surgery. The exclusion criteria included having spinal cord injury, having cognitive impairment and mental illness. Consecutive patients (N = 45) were invited, 24 patients were interested in participating and completed the interview until data saturation was reached. This study was approved by the ethic committed of our hospital (No. 202202-06) and strictly adhered to the tenets of the Declaration of Helsinki. All participated patients received the information sheet describing the purpose of this current study and the benefits of the participant. All participated patients signed the informed consent.

**Data collection**

Three trained study researchers from outside of the clinical team screened and interviewed patients using the face-to-face individual with in-depth semi-structured interviews. The interviewers had no relationship with the participants, and the participants were not compensated for participation in this study. The interviewers attended in the participants’ daily morning rounds with doctor in charge, and thus developed relationship of trust with the participants. The interview was conducted the day before discharge, at the due time based on the participants’ comfort in a conversation room, which was relatively private.

The interview questions were pre-determined by a group of experts in psychologists, anesthesiologists, nurses and surgeons (Table 1). The interview guide was used to ensure the areas of prior interest were explored in each interview. In the end, study researchers summarized the crucial points in the interview with participants to ensure accuracy and to solicit further comments. Interviews were audio-recorded for subsequent transcription, lasting between 30 to 60 minutes, and were completed from February to June 2022.
<table>
<thead>
<tr>
<th>Questions</th>
<th>Follow-up questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Think back to before surgery, what is your expectation for operation?</td>
<td></td>
</tr>
<tr>
<td>2. What challenging or difficult you were facing before surgery?</td>
<td></td>
</tr>
</tbody>
</table>
| 3. Think back to before surgery, did the hospital, surgeons, or nurses do anything to help you acquaint with the information about the operation and the postoperative rehabilitations? | 3A: When did you get the information?  
|                                                                          | 3B: What information did you obtain from them                                       |
|                                                                          | 3C: Who accompanied you to get the information? Do you think it is necessary to bring others with you together to get the information?  
|                                                                          | 3D: What did you like/dislike about the presurgical education?                      |
| 4. What challenging or difficult you were facing after surgery?          | Did anything surprise you or go wrong?                                              |
| 5. What is your expectation for postoperative ambulation?                | 5A: How long after surgery do you think is the appropriate time to get up out of bed?  
|                                                                          | 5B: How long did it take for you to feel wholly recovered (if at all)?               |
| 6. Did the hospital, surgeons, or nurses do anything to help you prepare or cope for the first-time postoperative ambulation? | 6A: What did they do to help you?  
|                                                                          | 6B: What did you like/dislike about the current preparation?                        |
| 7. Did the hospital, surgeons, or nurses introduce you to the postoperative early ambulation program? | 7A: When did you know about the program?  
|                                                                          | 7B: In what form? (e.g., oral, paper, video, APP)                                  |
|                                                                          | 7C: Could you fully understand the program?                                        |
|                                                                          | 7D: What other information about postoperative ambulation do you want to obtain from surgeons or nurses? |
Questions | Follow-up questions
---|---
8. Did you take part in the postoperative early ambulation program? | 8A: What was the reason for you to take part in or not take part in the postoperative early ambulation program?
8B: When was the first time for you to get out of bed ambulation?
8C: Did anything surprise you or go wrong in your ambulation?
8D: Was there anything you were not prepared for?
9. We want to know your thoughts, behaviors, and feelings that were challenging or difficult for you regarding postoperative ambulation. | 9A: Did any thoughts or worries bother you after surgery?
9B: What emotions were the hardest or most uncomfortable to deal with?
9C: Did you use any methods to help you feel better?
10. Did you suffer from extra pain during or after ambulation? | Did you stop the next time ambulation?
11. Did you use any strategies to manage the pain you experienced during or after ambulation? | What have you or others done to make the pain better or go away?
12. What did you or your family need during this period to help you with ambulation?
13. Do you think the postoperative early ambulation program is helpful for you? | 13A: What would such a program most concerned do you think?
13B: Is the program gets you benefits?
14. What other information regarded to ambulate you were getting from other channels?
15. Is there anything else you want to share with us?

Data analysis

Study researchers transcribed the audio-recorded interview contents. The Dedoose software which is a data management program designed for content analysis was used. In the initial analysis, two transcripts randomly selected from participants for summarize findings and delineate substantive themes discussed by participants\(^{(18, 19)}\). This is a process of open coding, creating categories and abstraction. The emerging themes were compared and discussed among investigators to ensure that they achieved similar themes or set a new one. Then an initial codebook was developed according to these themes and could be used to code the remaining interviews. Transcripts were then systematically coded. The initial codebook was modified according to the new identified themes emerging from analyzing new interviews, and also could be revised if the researcher redefined the current codes to include new information or
determined to distinct concept. After completing coding for all interviews, similar or dissimilar themes were ordered into more prominent themes, which are named using content-characteristic words or general thoughts or concepts(18). The interviews were reread, recode, reanalyze and re-collect until the themes provide breadth and depth. The Consolidated Criteria for Reporting Qualitative Research (COREQ) is used to improve the validity and rigor(20). The audio records, transcriptions and analysis documents were securely stored.

Results

Twenty-four patients were enrolled in participating and completed this study (Table 2). On average, the participants’ age was 67.1 years old, with a range from 60 to 76 years old. Most of the participants were female (62.5%), live in suburban (62.5%) and married (87.5%). 10 (41.7%) of all participants had high school or higher education experience, with an average length of stay after surgery 3.75 days. Six themes were identified: worries, benefits, daily routines, pain, education and supports (Table 3).
Table 2  
Participant demographics (N = 24)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean ± SD or No. (%)</th>
<th>Median</th>
<th>Interquartile range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td>67.1 ± 0.9</td>
<td>66.5</td>
<td>5.3</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>9 (37.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>15 (62.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Habitats</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suburban</td>
<td>15 (62.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Downtown</td>
<td>9 (37.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>21 (87.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>1 (4.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>2 (8.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>4 (16.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>High school or below</td>
<td>10 (41.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College or below</td>
<td>7 (29.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bachelor or above</td>
<td>3 (12.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Length of stay after surgery, d</td>
<td>3.75 ± 1.00</td>
<td>4.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>
Table 3
Themes and subthemes

<table>
<thead>
<tr>
<th>Themes</th>
<th>Subthemes</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Worries</td>
<td>1A. Fear, stress, insecurity</td>
<td>19 (79.2%)</td>
</tr>
<tr>
<td></td>
<td>1B. Screw failure</td>
<td>8 (33.3%)</td>
</tr>
<tr>
<td></td>
<td>1C. Bone recovery</td>
<td>5 (20.1%)</td>
</tr>
<tr>
<td></td>
<td>1D. Monitoring</td>
<td>6 (20.8%)</td>
</tr>
<tr>
<td>2. Benefits</td>
<td>2A. Rapid recovery</td>
<td>17 (70.8%)</td>
</tr>
<tr>
<td></td>
<td>2B. Physical functions</td>
<td>15 (62.5%)</td>
</tr>
<tr>
<td>3. Daily routines</td>
<td>3A. Sleeping posture</td>
<td>9 (37.5%)</td>
</tr>
<tr>
<td></td>
<td>3B. Get up</td>
<td>9 (37.5%)</td>
</tr>
<tr>
<td></td>
<td>3C. Exercise</td>
<td>15 (62.5%)</td>
</tr>
<tr>
<td></td>
<td>3D. Diet</td>
<td>6 (25.0%)</td>
</tr>
<tr>
<td>4. Pain</td>
<td>4A. Postoperative pain</td>
<td>20 (83.3%)</td>
</tr>
<tr>
<td></td>
<td>4B. Pain management strategies</td>
<td>17 (70.8%)</td>
</tr>
<tr>
<td></td>
<td>4C. Medications</td>
<td>10 (41.7%)</td>
</tr>
<tr>
<td>5. Education</td>
<td>5A. Patient education</td>
<td>20 (83.3%)</td>
</tr>
<tr>
<td></td>
<td>5B. Inconsistency</td>
<td>8 (33.3%)</td>
</tr>
<tr>
<td></td>
<td>5C. Trust for online information</td>
<td>6 (25.0%)</td>
</tr>
<tr>
<td></td>
<td>5D. Trust for other’s experiences</td>
<td>4 (16.7%)</td>
</tr>
<tr>
<td>6. Supports</td>
<td>6A. Family supports</td>
<td>18 (75.0%)</td>
</tr>
<tr>
<td></td>
<td>6B. Social supports</td>
<td>4 (16.7%)</td>
</tr>
</tbody>
</table>

**Worries**

It was understandable that patients feel anxious about and scared of the adverse effects that could result from ambulation right after spinal surgery. Almost all participants interviewed in this study were worried about the impact of early ambulation on their recovery process after lumbar decompression and fusion surgery, and whether this procedure would result in adverse physical outcomes such as intolerable pain, numbness and paralysis. These worries affected their enthusiasm for early ambulation.

“Actually, I did not know whether my decision was right to receive the early ambulation procedure right after surgery. However, I know if I do not, I will choose to keep to my bed for days and even weeks.” –
Interviewer 11

“I was very nervous about this thing (early ambulation) in my mind. My daughter told me that I must listen to what the doctor and nurse told me. Nevertheless, you know, I tend to be an anxious person, and I could not stop my anxiety.” – Interviewer 5

“Maybe it (early ambulation) is work for others, but I do not believe this, can you make sure of my safety? I had just had a major surgery, you know.” – Interviewer 21

Regardless of worries and concerns, participants interviewed also shared their positive opinions about early ambulation. They believed in the relatively rapid recovery process they could get from early ambulation. However, some of them still had doubts. Half of the participants had doubts assumed that ambulation too early could result in negative consequences, such as screw failure or delayed bone healing.

“Well, early ambulation sounds good, and I really would like to try it. However, I doubt that it will result in screw failure.” – Interviewer 2

“My age is old, and bone heals slowly. Will it affect bone healing if I ambulate too early? Maybe I should lay down to my bed until the bone heals.” – Interviewer 15

Although some participants interviewed in our study successfully ambulated with the help from nurses in the early stage after surgery, they also expressed their concerns about the physical condition they were in, and whether they were guaranteed safe. The monitoring devices seem to increase their anxiety.

“I have my blood pressure measured before and also after ambulation, do I have to be measured this frequently? This made me nervous.” – Interviewer 17

“I do not think it is necessary to use the monitoring device for me. I am fine!” – Interviewer 10

Benefits

Following lumbar spinal surgery, there is significant variability in postoperative rehabilitation and advice offered by doctors, nurses and physiotherapists. Patients were urgently wanting to get a rapid recovery and relief from what they were suffering before, such as pain, numbness and inconvenient actions. Early ambulation right after surgery is one choice for enhanced recovery, and participants thought early ambulation seems to be a good sign for a successful surgery and also for functional recovery.

“I had been lying in bed for two months (before surgery). I hope I can recover as soon as possible. I accept the recommendation of early ambulation by my doctor. I am so missing my friends and my work.” – Interviewer 1

Even though most of the participants interviewed expressed their wishes for early postoperative rehabilitation, half of them also acknowledged that they could not ambulate so early such as 4 hours
after surgery, for they were uncertain about the functional results. They questioned about what benefits they could get, such as “benefits of early ambulation” and “improvements of physical function”.

“*To be honest, no matter how much you said about the advantages of early ambulation, I did not see that, and I do not know whether it is suitable for me.*” – Interviewer 5

“I am not sure whether it (early ambulation) works.” – Interviewer 23

**Daily Routines**

Almost all participants described their concerns about the detailed movements in daily routines. They feared that the incorrect activities would offset the benefits getting from early ambulation and that being too active would result in negative physical consequences. These concerns often lead them to be fearful of daily activities, sleep comfort, back to work, ability to exercise, and preventing future disability.

“*Actually, I am a little upset about various situations in my daily routines.*” – Interviewer 7

The most frequent question that participants mentioned was the sleeping posture. They complained that the posture for sleeping that the nurse told them cannot be held for a long time at night. They were also afraid of changing postures in bed, the help provided by their families were thought to be unprofessional and sometimes led to severer pain or uncomfortable.

“I do not know even how to sleep! I have to think if this posture is right for me.” – Interviewer 3

Another daily routine they concerned about was how to manage themselves at home, such as how to get up from bed, when to walk and how to do exercise. For most of the participants chose to go home rather than to a rehabilitation center or a skilled nursing facility, they were afraid of daily activities without help from health care professionals.

“It’s a pity that the nurse cannot go with me when discharge. I want to employ him. He is professional.” – Interviewer 3

“I still need to assist now, and I am trying hard learning how to get up and walk correctly.” – Interviewer 15

In order to carry out their daily routines successfully, the participants also asked about the recommended diet balance. They were wondering what they should or should not eat or drink for their current physical conditions, and what was the most suitable diet for ambulation and would accelerate the recovery process.

**Pain**

Pain is one of the most critical factors affecting early ambulation. The participants interviewed shared multiple stories about how their surgical experience and how they were suffers from postoperative pain. They expressed a need for a recovery plan from their health care team following surgery to manage the
insufferable pain. However, early ambulation is also one of the critical factors that bring on or increasing the postoperative pain.

“"I was seriously suffering from low back pain, and, I wanted to solve this problem through surgery. However, what I did not expect was that the pain was worse than before after operation, and even my legs began to painful, and I could not walk right after surgery.””—Interviewer 16

“I have severe low back pain after surgery. When I lie down, the symptom gets better. When I walk, the symptom gets worse. I do not want to walk.”—Interviewer 3

In our study, we asked the participants about the pain management strategies they used in ambulation, in the purpose of managing pain effectively. Patient-controlled analgesia (PCA) was the most common pain relief method to be used. Prescription opioid medications were also added to existing regimens for patients managing acute pain after ambulation. Postoperative pain made early ambulation even harder to perform, although the participants understood that pain might be getting worse during and after ambulation, they just did not have an expectation for how severe the pain will be, and what situation was acceptable and when they should require help for medication intervention. Moreover, sometimes they just refused to ambulate rather than using medication intervention solving the increasing pain after ambulation.

“I do not know at what level of pain I should take the medications and how they worked and how often should I take it.”—Interviewer 3

Some participants experienced adverse effects after using PCA or taking opioid medications. One participant said she was afraid of vomiting after using PCA, and now she could only suffer from pain without using any medications. Some participants expressed a dislike for taking pain medications or an intention to use as little medications as possible, eventually stopped taking their prescriptions.

“I do not want to rely on pain medications any longer. I had enough.”—Interviewer 24

“I will never take pain medications. Pain-relieving drugs are addictive. When I feel pain, I would rather like to suffer from it.”—Interviewer 18

On the contrary, a few of other participants taking excessive pain medications when severe pain occurred after ambulation. They thought the pain should be relieved soon after intaking the medications. If the symptom remained, they tended to continue to take more pills until it worked.

“The medication is not effective. I have to use over recommendations.”—Interviewer 8

“I need more stronger painkillers, and the current one is completely useless.”—Interviewer 12

Education
Education is an essential part of increasing patients’ understanding and compliance for early ambulation after spinal surgery. Based on the preoperative appointment with the chief surgeon the day before surgery, patients could obtain information about the surgical plan, what to expect during and after surgery. Also, they could learn about early ambulation program after surgery in their recovery process. In our center, at the current stage, nurses mainly conducted the patient early ambulation educations. The ambulation indications were given to the patients in the forms of oral or written, and usually at the time before the first-time ambulation after surgery. However, some participants complained that the information and the indications were too much and complicated, which could not be easily and fully understood.

“The doctor had a conversation with my family and me. He talked very detail and professional about the surgery. However, I couldn’t understand the talking. The doctor looked so busy. I was too embarrassed to ask any question, anyway, I did not understand.” – Interviewer 8

“The nurse told me the precautions for the first time ambulation, but I did not fully understand, and it also hard to remember.” – Interviewer 19

Other participants also complained that the health care providers did not provide enough information about the significance of early ambulation and also the severity of complications can be due to prolonged lying in bed. They did not fully understand the concept and significance of “early ambulation”, and not aware enough of the potential complications could happen to them if they were lying in bed for too long.

“The nurses said somethings about it (complications of lying in bed), but I do not believe it will happen to me.” – Interviewer 6

Another concern raised by the participants was the different opinions on the timing for first time ambulation among the surgeons, anesthesiologists, physiatrists and nurses. Moreover, sometimes, even the chief nurses’ indications were different from the chief surgeons’. It was difficult to correct the first time ambulation timing when it was told wrongly by other surgeons, anesthesiologists, physiatrists or nurses, and it was more likely to cause distrust, confused, irritability or antipathy of the patients.

“The nurse told me that I could get off bed 4 hours after surgery, however, the anesthesiologist told me that I had to stay in bed for at least 12 hours.” – Interviewer 7

“They do not have the same opinion on when should I get off the bed, they seem to have some disagreements. I feel hard to trust any of them, even if they are my health care providers.” – Interviewer 12

A small part of participants interviewed also complained that what the health care providers told them were not the same with what they found on the internet. Some of them expressed their wishes to trust the information they got from the internet and also the experience of other patients but rather than from the doctors and nurses. One participant also told us that she believed in the advice from the “experts” on the internet through paid consultation online.
“One of my friends had the same surgery last year. He told me not to get up until one month later after surgery. And I think he is right.” – Interviewer 10

Supports

One of the most important themes identified from the interview data was the need of family supports. Most of the participants in our study chose to go home rather than to a rehabilitation center or a skilled nursing facility when discharge. Unlike the patients in rehabilitation center could get the ambulation assisted from nurses, doctors and rehabilitation therapists, patients at home could only rely on family members. However, according to the information we extracted from the interview data, lack of support is one of the most important factors hindering patients' enthusiasm for ambulation.

“My husband has to go to work every day. It's hard to ambulate all by myself. I could only get up for some activities after he came back.” – Interviewer 9

Meanwhile, how the family members thinking about ambulation will also influence the patients by encouraging or discouraging them. The family members declined to provide help will reduce their patients’ activities.

“My wife thought it was not good for me to ambulate too much. She said when I discharge to home, I should do what she told me for she is my caregiver, not the nurse.” – Interviewer 22

Besides the need for help, patients rely on their family members to know what to do and to problem-solve in the process of ambulation. Having suggestions for what to do when doing activities, and in a specific situation such as managing pain, dealing with tired, would be helpful for patient and family so that they know how to respond.

“When I was ambulating, she (daughter) had no idea about what she could do to encourage me.” – Interviewer 11

Other patients also expressed the hope for that they want to go to a rehabilitation center or a skilled nursing facility, for further treatment after discharge. Although their family members were able to meet their needs and provide adequate help, they still tend to require the support of the professionals. However, there were too few such rehabilitation centers to choose from, and the costs are high.

Discussion

Immobilization after spinal surgery could accompany with some potential problems, such as urinary tract infection, hypostatic pneumonia, muscle weakness, skin pressure injury, and venous thromboembolism(4). Some of them are potentially lethal, especially for elderly patients, which force us to change in postoperative care style from immobilization to early ambulation. Early physical activities could strengthen paravertebral muscles and spinal joints which facilitates postoperative rehabilitation, and has been demonstrated to have benefits on improving patients' feelings and lower complication.
rates\((21, 22)\), also apparently shorter length of stay\((23)\). Guidelines regard to lumbar spinal surgery patient care recommend that all patients should mobilize quickly unless ordered differently because of the type of surgery or complication, such as cerebrospinal fluid (CSF) leak\((3)\). Patients with CSF leak are used to handle with limit their mobility with mandatory postoperative bed rest for 24 to 72 hours to avoid increasing in intradural hydrostatic CSF pressure which will result in complications like postural headache, nausea and vomiting, nerve root herniation and wound infection\((24)\). However, recently, the benefit of prolonged postoperative bed rest, however, has been challenged by a randomized controlled study. Which demonstrating even with CSF leak, there is no additional benefit of prolonged bed rest after an adequately repaired cerebrospinal fluid leak in lumbar spinal surgery\((25)\). Ambulation as early as possible is suitable and profitable for all patients undergoing lumbar decompression and fusion surgery.

Recent studies have proved early ambulation after spinal surgery can improve patients’ feelings and long-term outcomes, increasing health care providers recognized the importance and benefits, and trying to introduce it in clinical applications. However, there are still obstacles in practice. In our current study, participants showed low acceptance rate for early ambulation. Given different education level and cultural background, participants expressed different understanding for early ambulation. 33.3\% (7/21) below bachelor education degree participants feel confused about the concept of early ambulation, and also doubt about its necessity. Regardless of the severity that complications can be due to prolonged lying in bed, this part of participants tend to selective neglect the complications and simply believe complications will never happen to them. Nearly all of them (85.7\%, 6/7) assumed that ambulating too early or too active might lead to other negative physical consequences. They should only resume activities after feeling fully recovered. However, it was difficult to achieve full recovery in a short period, and this often led to prolonged immobilization in bed for days and even weeks\((26, 27)\).

Regards to lumbar spinal surgery patient care, although guidelines recommend patients should mobilize quickly after surgery, however, the optimal timing for the first-time ambulation is still not precise. Sometimes health care providers and patients alike are confused about when patients should get out of bed for the first-time ambulation. Despite the fact that most of the researchers suggest patients ambulate on the post-operation day, but there is some disagreement on the optimal time to initiate ambulation. In a retrospective study of patients following lumbar spinal fusion surgery, patients were recommended to roll and walk to the doorway right after surgery\((28)\). Nonetheless, in the early mobilization protocol conducted by Cleveland Clinic Foundation, all postoperative spinal surgery patients without contraindication were suggested to mobilize within 8 hours after arriving at the regular nursing floor\((29)\). Confusing about the optimal time to initiate ambulation will make patients tend to be conservative, and reduce the enthusiasm for early ambulation, which will finally result in prolonged bed rest. In a retrospective study conducted by Michigan Spine Surgery Improvement Collaborative, among 23,295 patients undergoing lumbar decompression and fusion surgery, more than 40\% of patients did not ambulate on the post-operation day\((30)\).

Disagreement on the timing for ambulation among health care providers will also lead to inconsistency when carrying on patient educations. 33.3\% (8/24) participants in the current study complained that they
had been told inconsistent information from surgeons, anesthesiologists, physiatrists or nurses regard to ambulation. Inconsistency will lead to distrust and antipathy among patients, and trust is the key in the patient-physician relationships(31, 32). When patients cannot obtain genuine care from their health care providers, the good patient-health care provider relationships cannot be established, the trust on surgeons, anesthesiologists, physiatrists and nurses is hard to shape, which will lower patients’ compliance to postoperative ambulation.

In spite of evidence-based researches recommend for patients to initiate ambulation early after surgery, however, there is still no detailed guidelines for the optimal time and procedures to initiate ambulation. Unequivocal guidance issued by the professional committee or government is urgently needed for clinical practice. Furthermore, the hospital itself should unify the procedures and regulations of postoperative early ambulation in benefit to patient education from health care providers. Patient education from hospital, surgeons, and nurses is an essential part of postoperative ambulation. In purpose to improve patient education, there should be a multidisciplinary ambulation protocol which issued by administrative staff, spine surgeon, nurses, rehabilitation therapist, anaesthetist and nutritionist, and approved by the faculty committee and also the ethics committee. The multidisciplinary protocol should be well educated to all staffs in hospital, and should be posted at the nurses’ stations and also in the restrooms for better remember, one-to-one education should be provided if conditions allowed. Besides the content, for improving patient compliance to multidisciplinary ambulation protocol, the timing for education is also important. Patient education is better to initiated just from the first-time appointment with surgeon preadmission(33). In addition, education is continuous, should be carried out before, during and after surgery. Except for oral and written education form, the video education and mobile app which could provide more effective preoperative education should also be considered. It is essential to ensure that the patient fully understands ambulation protocol and the following functional aspect of physical activities that the patient himself/herself can resume early on and the management of analgesics at home(28).

For participants agreed with the concept of early postoperative ambulation, the most frequent mention theme against ambulation is pain. 58.9% (10/17) of them consider postoperative pain is the main reason for them refusing to ambulate, and this result was consistent with other studies previously(34, 35). Lumbar decompression and fusion surgery is among the six most painful procedures(36), and patients are often suffering from a high level of pain on the first postoperative day. Pain has rippling effects on patients’ enthusiasm for postoperative ambulation. Some participants expressed the concerns about the increasing pain brought by ambulation, which had become a major hindrance to their early ambulation program. Postoperative pain management is challenging, and procedure-specific pain management plans are needed. A comprehensive pain management plan should be made in partnership with the patient himself/herself, spine surgeon, nurses and patient’s family caregivers(34). It was part of the multidisciplinary ambulation protocol. Patients should be informed about the need for both nonopioid medications and nonpharmacologic strategies(34). Some studies reported that there is a consistent association between opioid use and worse outcomes after spinal surgery(37, 38). In contrast, the opioid-free model shows no significant differences in pain control or postoperative opioid consumption(39). An adequate pain management plan for postoperative ambulation should be comprehensive, offers not only
pharmacological strategies but also the physical modalities. It gives patients the best opportunity to find a successful combination of strategies to control pain during ambulation and further physical activities.

Other participants (17.6%, 3/17) also complained about the monitoring devices for its adverse effects on patients’ enthusiasm for ambulation. The monitoring devices recorded patients’ vital sign after surgery, however, keeping connected to these machines restricted patients’ mobility and tied them in the bed. When ambulating, the monitoring devices should be accompanied with them, which make patients feel troublesome, uncomfortable, upsetting, and reducing the enthusiasm for ambulation. Although the wearable and wireless monitors could offer a solution, however, these medical devices are still not available in the current stage of clinical practice(7).

The results of the current study illustrate how critical family supports are to the patients in the postoperative recovery process. 75% (18/24) interviewed participants shared the attitude that supports from their family members were essential to their keeping on ambulation. However, for better patient care, family members need to know how to assist ambulation, what will happen, and what limitations the patient will face during ambulation and what the patient will need after ambulation. This information will enable family members to make realistic plans to best assist the patient in their ambulation. If possible, patients should be encouraged to bring their family members to attend the preoperative appointment, and educated together about the multidisciplinary ambulation protocol, including a pain management plan. Patient’s family members may benefit from addressing preparatory information and coping skills during education from health care providers(40).

**Limitations**

In this qualitative study, by using semi-structured interviews, we were able to achieve a deeper understanding of patients’ experience and concerns on early ambulation. However, there were still limitations, the result was limited to one academic medical center and may not be representative of other settings. Like other exploratory studies, this study was designed for a specific category of patient, which may limit the generalizability.

**Conclusions**

This research revealed six themes about elderly patient’s experience and concerns for early ambulation following lumbar spinal surgery. The findings can be used to guide future interventions for elderly patients postoperative early ambulation. Unequivocal guidance for early ambulation and multidisciplinary ambulation protocol, including a comprehensive pain management plan are essential for health care providers induced patient education. Which may have a positive effect on reducing stress and get rid of anxiety for postoperative early ambulation. Furthermore, education is not only for the patient but also for family members and all support caregivers who have the impact of supporting early ambulation.
Declarations

Ethics approval and consent to participate

This study was approved by the Ethics Committee of Jishuitan Hospital (NO. 202202-06), and strictly adhered to the tenets of the Declaration of Helsinki. All patients enrolled signed the consent form.

Consent for publication

Not applicable.

Availability of data and materials

All data generated or analyzed during this study are included in this published article.

Competing interests

The authors declare that they have no competing interests.

Funding

Scientific research fund project of Beijing Jishuitan Hospital (HL-202202)

Authors' contributions

Jie Huang designed the study, analyzed the data, and was a major contributor in writing the manuscript. Pan Li, Huiting Wang and Chenxi LV contributed in the face-to-face individual interviews and records. Jing Han revised the manuscript. Xuemei Lu Provided guidance for this study. All authors read and approved the final manuscript.

Acknowledgements

Not applicable.

References


