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# Lumbar Puncture: Nurses` Knowledge, Practice and Patients` Satisfaction with Nursing Care

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**Abstract:** Background: Patients` satisfaction with nursing care provided is a good indicator for improving quality of care. Aims: Assess nurses` knowledge and practice regarding lumbar puncture and investigate patients` satisfaction with nursing care pre and post application of nursing instructions brochure. Research design: Quasi-experimental. Subjects and methods: All available nurses (22) in neurosurgery department at Assiut Neurological, Psychiatric and Neurosurgery University Hospital. Also, a sample of 60 adult patients undergoing lumbar puncture was included and divided into two groups (A and B). Group A (30 patients before application of nursing instructions brochure) and group B (30 patients after application of nursing instructions brochure). Nurses` knowledge and practice were assessed before and after application of the nursing instructions brochure. Tools: Structured questionnaire to assess nurses` demographic data and knowledge, observation checklist for nurses` practice, patients` satisfaction with nursing care scale and nursing instructions brochure for nurses. Results: Highly significant differences were found as regarding nurses` knowledge and nurses` practice pre and post application of the nursing instructions brochure. Significant difference was found between groups (A and B) regarding patients` satisfaction with nursing care. Conclusion: Nursing instructions brochure had a significant effect on improving patients` satisfaction with nursing care. Recommendation: Patients` satisfaction with nursing care should assess periodically in every care settings.

**Keywords:** Lumbar Puncture, Nursing Instructions Brochure, Patients` Satisfaction

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## 1. Introduction

Nursing education supports professional practice of nursing and delivery of a safe and high quality care for patients. Continuing nursing education and training are vital components to provide patients with best possible care. Nurses` knowledge cannot be gained easily through experience in their work [1].

Newly employed nurses require in-service education and training to update them regarding the latest developments in nursing management. In-service education and training will remain a significant investment in developing and maintaining essential competencies required for effective nursing management in all health care settings [2, 3].

Patient`s satisfaction is defined as patient`s judgment on

the goodness and quality of care [4]. Assessment of patient`s satisfaction with nursing care is very important to evaluate whether patient`s needs are fulfilled and thus facilitate planning and implementing appropriate nursing interventions for patient [5]. Nurses should be knowledgeable, skilled and competent to provide high quality care for patients. Also, every patients want nurses to have a good caring and human attitude, respect them and make them feel with safety and feel comfortable [6].

Lumbar puncture is a procedure to sample or draw cerebrospinal fluid. It often performed to obtain information about cerebrospinal fluid [7]. It usually used for diagnostic purposes to rule out potential conditions such as benign intracranial hypertension, subarachnoid hemorrhage, bacterial meningitis or multiple sclerosis. It is sometimes used for therapeutic purposes such as managing disorders of

intracranial pressure (idiopathic intracranial hypertension or normal pressure hydrocephalus). Lumbar puncture is required to obtain indirect measurements of intracranial pressure [8, 9].

Lumbar puncture should perform only after careful neurological examination. If possible, cranial computed tomography or magnetic resonance imaging for every patient should review carefully before lumbar puncture procedure [10]. There are no absolute contraindications for lumbar puncture but certain cautions should be taken in patients with bleeding tendency, receiving anticoagulant medications, spinal epidural abscess, and patients with clinical signs of increase intracranial pressure include loss of consciousness, papilledema, focal neurologic deficit and recent onset of seizure [11].

Complications of lumbar puncture may include headache, backache, infection, lower limb weakness, subdural hematoma, bleeding or cerebrospinal fluid leak from the puncture site, nerve damage or brain herniation. Headache and backache are the most common complications post lumbar puncture while infection, lower limb weakness, bleeding or cerebrospinal fluid leak, subdural hematoma, nerve damage and brain herniation are uncommon [12].

Lumbar puncture often causes anxiety and stress for patients. In order to minimize patients' discomfort and possible post lumbar puncture complications, the nurse must orient patients and their families about instructions regarding lumbar puncture before, during, and after the procedure [13].

Before lumbar puncture procedure, nurses should inform patients about the procedure. Informed consent must be obtained. Ask patients to empty bowel and bladder. Nurses should perform complete neurological assessment for patients, measure vital signs, prepare equipment and review results of the laboratory tests especially coagulation studies and notify neurosurgeon for any abnormalities [14].

During lumbar puncture procedure, any patients' movement should be avoided to avoid nerve injury, administer prescribed sedation if required and reassurance may be helpful. Patients usually lies in lateral position, move back closed to edge of bed, draw knees toward chest as tight as possible and flex chin onto the chest. Nurses should follow sterile aseptic technique during procedure [15].

After lumbar puncture, nurses assess patients for any complications, lying flat for 4 hours is recommended, patients' vital signs should be measured, if not contraindicated encourage patients to increase fluid intake and observe puncture site for leakage or bleeding [16].

### 1.1. Aims

- 1) Assess nurses' knowledge and practice regarding lumbar puncture pre and post application of the nursing instructions brochure.
- 2) Investigate satisfaction of patients undergoing lumbar puncture with nursing care pre and post application of the nursing instructions brochure.

### 1.2. Research Hypothesis

- 1) Level of nurses' knowledge and practice post

application of the nursing instructions will be higher than pre application of the nursing instructions.

- 2) Level of patients' satisfaction with nursing care post application of the nursing instructions (group B) will be higher than pre application of the nursing instructions (group A).

## 2. Subjects and Methods

### 2.1. Research Design

Quasi-experimental research design was utilized to conduct this study.

### 2.2. Participants and Setting

All available nurses (22) in neurosurgery department at Assiut Neurological, Psychiatric and Neurosurgery University Hospital in addition to a sample of 60 adult neurosurgery patients undergoing lumbar puncture from both sexes, their age ranged from 18- 65 years old. Group A (30 patients received routine hospital care before application of the nursing instructions) and group B (30 patients received nursing care after application of the nursing instructions). Patients who performed previous lumbar puncture or unconscious patients were excluded from the study sample.

### 2.3. Tools

#### 2.3.1. Tool I: Structured Pre/Post Test Questionnaire for Nurses Caring for Patients Undergoing Lumbar Puncture

It was developed by researchers after reviewing different literatures to assess demographic data and nurses' knowledge about lumbar puncture. It included fifteen questions (5 true or false and 10 multiple choice) concerned with definition of lumbar puncture, normal value, indications, contraindications, complications and nursing role pre, during and post lumbar puncture. One degree was given for each correct answer, total score was 15. A score of <50% was considered unsatisfactory and  $\geq 50\%$  was considered satisfactory.

#### 2.3.2. Tool II: Observation Checklist for Nurses Caring for Patients Undergoing Lumbar Puncture

It was developed by researchers after reviewing different national and international literatures. It included 19 items to investigate nurses' role pre, during and post lumbar puncture. Three point likert scale used to assess nurses' practice, 3 indicate done correctly, 2 indicate done incorrectly and 1 indicate not done. It included risk assessment, preparation for equipment, provide patients with adequate explanation about procedure, adequate preparation for patients (appropriate wearing, empty bladder before procedure, appropriate positioning), maintain safe and quite environment with good lighting, handling equipment in sterile manner during procedure, monitor and document patients' vital signs and neurologic signs, monitor insertion site, patients' positions and fluid intake post procedure and report any abnormal findings. Adequate practice level was considered at score of

≥75%.

### 2.3.3. Tool III: Patient Satisfaction with Nursing Care Scale

It was developed by (Cox 1982) to assess patient's satisfaction with nursing care. Patient's gender and age also assessed. It consists of 20 items on a 4 point likert scale (1= strongly disagree, 2= disagree, 3= agree, 4= strongly agree) [17].

### 2.3.4. Nursing Instructions Brochure for Patients Undergoing Lumbar Puncture

It was covered knowledge and practice regarding nursing care for patients undergoing lumbar puncture. It was designed by researchers after reviewing different literatures and its content was translated into Arabic. Knowledge concerning definition of lumbar puncture, indications, contraindications, technique, complications and nursing role pre, during and post lumbar puncture (adequate preparation for equipment, adequate preparation for patients, maintain safe and quite environment with good lighting, maintain sterile technique during procedure, monitor patients' vital signs and neurologic signs, monitor insertion site, patients' positions and fluid intake post procedure, and abnormal findings that may develop post procedure).

## 2.4. Methods

Official permission and approval was obtained from the head of neurosurgery department and local ethical committee. Informed consent was obtained from nurses and patients after explanation to the study. Five experts; 2 experts from medical surgical nursing staff, 2 from nursing administration staff and 1 from neurosurgery staff were engaged to review the validity of the content. Study tools were valid and reliable. Reliability was assessed by Cronbach's alpha coefficient (0.85). Pilot study was conducted on 10% of sample for testing clarity, applicability, and feasibility of tools. No changes were done, so the 10% of study sample were included in the study.

The researchers asked nurses to answer the structured pre/post test questionnaire (tool I) to assess nurses' knowledge before application of the nursing instructions brochure. The researchers observed nurses' practice while caring for patients undergoing lumbar puncture and filled out the observation checklist (tool II) to assess nurses' practice before application of the nursing instructions brochure. Data collection for group (A) patients was taken 6 months. After this period three educational and training sessions for five weeks were conducted for nurses. Duration of each session was 2 hours, in addition, there were 15-25 minutes to discuss any questions and regain feedback. Nurses were divided into small groups (each group contained 2-3 nurses) to ensure continuity of patients' care.

The content of the nursing instructions brochure was introduced to nurses, also nurses were trained about how to

prepare and maintain sterile field and how to use and handle equipment in sterile manner. After explanation to the content of the nursing instructions brochure nurses were given copies of the nursing instructions brochure and the researchers discussed any questions with them.

Nurses' knowledge and practice were assessed immediately after application of the nursing instructions brochure and for 6 months which was the period of group (B) data collection, nurses were asked to fill out (tool I) to assess their knowledge and the researchers filled out (tool II) to assess their practice to evaluate the effect of the nursing instructions brochure on nurses' performance.

Patients' satisfaction with nursing care for group (A) was assessed using (tool III) before application of the nursing instructions brochure while patients' satisfaction with nursing care for group (B) was assessed after application of the nursing instructions brochure to evaluate the effect of the nursing instructions brochure on patients' satisfaction with nursing care.

### Statistical Analysis

SPSS 19.0 was used for statistical analysis of collected data; t-test and Pearson chi-square tests were used to analyze quantitative and qualitative data respectively. Statistical significance was considered at level of p-value ≤ 0.05

## 3. Results

Table 1: Mean age of nurses (30.52± 15.79) and the majority (86.36%) were females. Majority of nurses (90.90%) were having diploma degree and (81.81%) were having more than 10 years of experience.

Table 1. Demographic characteristics of nurses.

Characteristics	No. (n=22)	%	X± S.D
<b>Age:</b>			
17 < 25 years	3	13.63	
25 < 45 years	17	77.27	30.52± 15.79
≥45 years	2	9.09	
<b>Gender:</b>			
Male	3	13.63	
Female	19	86.36	
<b>Education:</b>			
Diploma degree	20	90.90	
Bachelor degree	2	9.09	
<b>Nurses' years of experience:</b>			
< 5	2	9.09	
5 ≤ 10	2	9.09	
> 10	18	81.81	

Figure 1: Highly statistical significant difference between nurses' knowledge about lumbar puncture pre and post application of the nursing instructions brochure. All nurses caring for patients undergoing lumbar puncture in neurosurgery department were having satisfactory level of knowledge (100%) post application of the nursing instructions brochure.

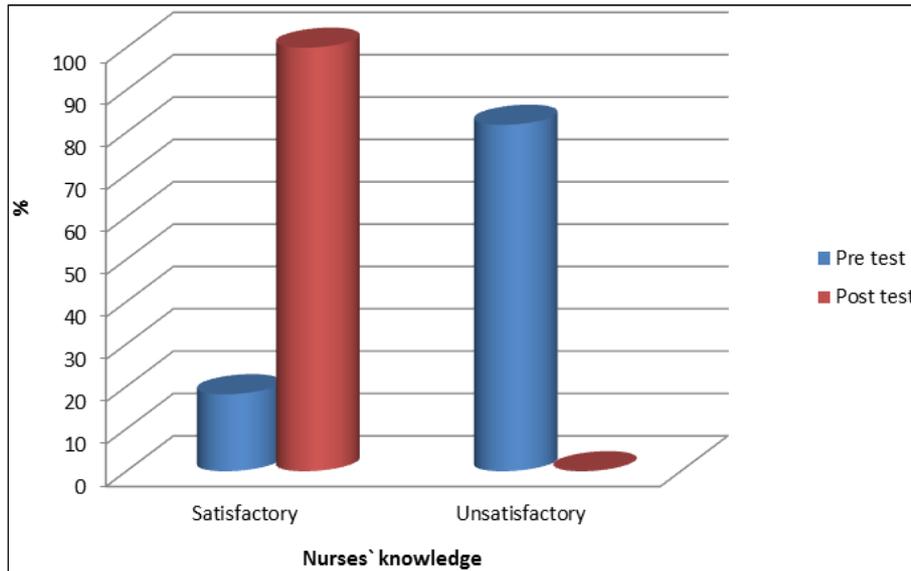


Figure 1. Nurses' knowledge pre and post application of the nursing instructions brochure.

Figure 2: Highly statistical significant difference between nurses' practice pre and post application of the nursing instructions brochure. Majority of nurses (86.36%) were having adequate level of practice post application of the nursing instructions brochure.

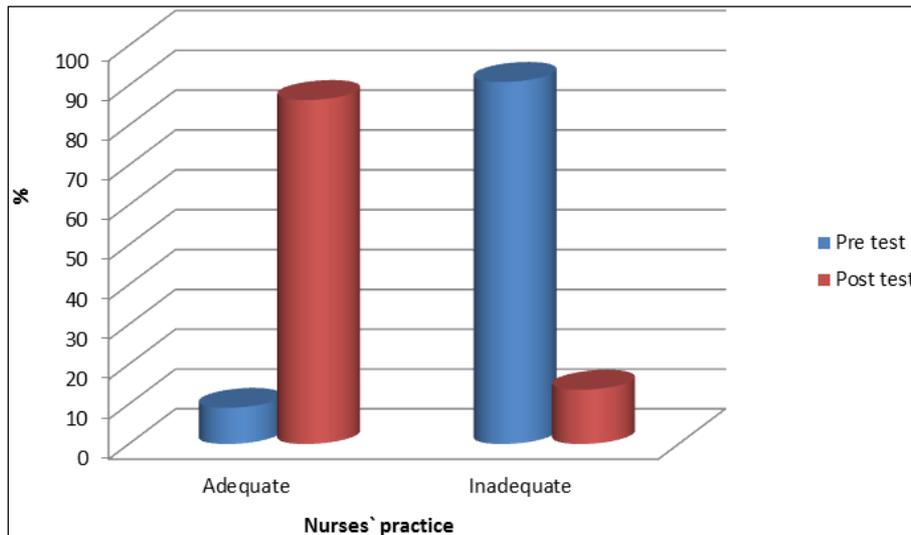


Figure 2. Nurses' practice pre and post application of the nursing instructions brochure.

Table 2: More than half of patients in group (A) and group (B) were females with mean age of (36.9± 12.48 and 39.2± 14.91 respectively).

Table 2. Demographic data for patients undergoing lumbar puncture.

Patients' demographic data	Group (A) (n =30)			Group (B) (n =30)		
	No.	%	X ± SD	No.	%	X ± SD
<b>Age:</b>						
18 < 30 years	7	23.33	36.9± 12.48	4	13.33	39.2± 14.91
30 < 50 years	23	76.66		26	86.66	
<b>Gender:</b>						
Male	14	46.66		12	40	
Female	16	53.33		18	60	

Table 3: Non statistical significant difference was found between group (A) and group (B) of patients as regarding post lumbar puncture headache. All patients in group (A) and group (B) suffered from post lumbar puncture low back pain.

**Table 3.** Post lumbar puncture complications.

Post lumbar puncture complications	Group (A) (n =30)		Group (B) (n =30)		P-value
	No.	%	No.	%	
Headache:	24	80	17	56.66	P=0.521
- Relieved within 24-48 hours	5	20.8	13	76.47	
- Relieved after 48 hours	19	79.16	4	23.52	
Low back pain	30	100	30	100	

Table 4: There was significant difference (<0.02) as regarding patients' satisfaction with nursing care pre, during and post lumbar puncture between patients in group (A) and group (B). Group (B) was having high level of score in all (20) items of the patients' satisfaction with nursing care scale than group (A).

**Table 4.** Patients' satisfaction with nursing care pre, during and post lumbar puncture.

Patients' satisfaction with nursing care scale	Group (A) (n =30)		Group (B) (n =30)		P-value
	X ± SD	X ± SD	X ± SD	X ± SD	
1. Nurses can answer any questions correctly.	2.1±0.3	3.0±0.7			<0.02*
2. Nurses are caring.	2.2±0.9	3.1±0.6			
3. Nurses deliver care competently.	2.4±0.4	3.0±0.8			
4. Nurses involve me in hospital care.	2.7±0.2	3.0±0.6			
5. Nurses treat me with respect.	3.1±0.2	3.3±0.6			
6. Nurses are skilful in performing nursing procedure.	2.2±0.5	3.1±0.9			
7. Nurses provide me with important information during hospitalization.	2.0±0.2	3.2±0.8			
8. Nurses involve my family in hospital care.	2.5±0.5	3.1±0.7			
9. Nurses render nursing services without delay.	3.0±0.2	3.0±0.9			
10. Nurses smile whenever they approach me.	2.3±0.4	3.4±0.5			
11. I receive useful information about my condition from nurses.	2.0±0.1	3.2±0.7			
12. Nurses ask me permission before performing nursing procedure.	2.2±0.8	3.1±0.7			
13. Nurses are professional when rendering nursing services.	2.3±0.2	3.0±0.8			
14. Nurses give encouragement to me.	2.0±0.3	3.5±0.4			
15. I receive useful information during discharge planning from nurses.	2.0±0.4	3.1±0.7			
16. I can make my own decision when being cared by nurses.	3.0±0.2	3.0±0.6			
17. Nurses use physical touch in supporting me.	2.1±0.4	3.2±0.7			
18. I have been given privacy from nurses.	3.0±0.1	3.0±0.8			
19. I feel safe when receiving nursing care from nurses.	2.4±0.3	3.1±0.6			
20. Nurses explain nursing procedure clearly before performing it.	2.0±0.1	3.1±0.7			

## 4. Discussion

Neurosurgery nursing is a highly sophisticated and challenging specialty. It requires high clinical skills and a sophisticated knowledge to maintain high quality care for neurosurgery patients and gain their satisfaction [18]. In neurosurgery, lumbar puncture is a sensitive invasive diagnostic test in which cerebrospinal fluid is extracted for examination and pressure of the cerebrospinal fluid is measured [14, 15, 16].

The study revealed that the majority of nurses were aged from 25<45 years and the majority of them were females, having diploma degree and having more than 10 years of experience.

In this study most nurses in neurosurgery department had unsatisfactory and inadequate levels of knowledge and practice regarding their responsibilities and roles toward patients undergoing lumbar puncture pre application of the nursing instructions brochure. All nurses in neurosurgery department were having satisfactory and adequate levels of knowledge and practice post application of the nursing instructions brochure.

This illustrated the effect of the nursing instructions brochure on improving nurses' levels of knowledge and

practice. High level of nurses' knowledge reflected on their practice; knowledgeable nurses provide more accurate care.

This similar to the study results of (Feroze et al. 2017) a positive relation was found between nurses' knowledge and practice. Nurses with proper levels of knowledge and practice could help in rehabilitation of patients [19].

Nurses during their undergraduate period especially for diploma degree nurses did not receive enough information regarding neurosurgery. They gained their knowledge from neurosurgeons and from old nurses while they working with them. Lack of educational and training programs, workshops, and seminars are all contributing to nurses lack of knowledge and practice and this opinion is similar to the study of (Zatton 2007) [20] and (Hickey 2013) [18].

Similar results were found in the study of (Beeckman et al. 2011) who reported that knowledge of nurses about pressure ulcer prevention in Belgian hospitals was poor. Attending additional and more training programs was positively correlated with higher scores of knowledge [21].

Knowledgeable nurses play critical role in healthcare delivery system [22]. Nursing students are in role transition as they gradually learn different nursing roles. All roles are important in patient care and these roles interconnected in practice. Nursing roles include: provider of care, educator, counselor, manager, researcher, collaborator, and patient

advocate. To meet the demands of these different roles, nurses need to be prepared and competent. Prerequisites and nursing curriculum, through content, simulation laboratory experiences and clinical experiences help nursing students to transition to these roles [23].

There is a necessary need to consider continuing education and in-service educational programs for nurses to enable them to stay current with changes in health care practices. As advancement in technology, changes in nursing practice should initiate with changes in the educational curriculum of the nursing programs to improve nursing practice (Ajani and Moez 2011) [24].

Nurses should understand that good adoption of knowledge to their practice is essential while caring for patients to prevent many complications and to provide high quality care. Nurses need for support and encouragement to transit their knowledge to care practices for professional nursing care for patients (Tarakcioglu Celik and Korkmaz 2017) [25].

Regarding patients, more than half of patients in group (A) and group (B) were females with mean age of  $(36.9 \pm 12.48$  and  $39.2 \pm 14.91$  respectively). The majority of group (A) patients suffered from post lumbar puncture headache while more than half of group (B) patients suffered from post lumbar puncture headache. All patients in group (A) and group (B) suffered from post lumbar puncture low back pain.

The finding of the present study is consistent with the study of (Majd et al. 2011); 60 male and 65 female performed lumbar puncture with mean age  $50.96 \pm 13.15$  [13].

Similar to (Sun-Edelstein and Lay 2012) post lumbar puncture headache is the most common complication which occurs in 10% to 30% of patients performing lumbar puncture [26].

Headache following lumbar puncture is caused by low pressure in the spinal fluid space. A number of factors are responsible for post lumbar puncture headache; body position during procedure, needles and techniques used and female gender. Younger women may be at a greater risk for post lumbar puncture headache because of increased dural fiber elasticity that maintains patent dural defect compared to less elastic dura in older patients (Alstadhaug et al. 2012) [27].

The high incidence of post lumbar puncture headache and post lumbar puncture low back pain in this study may be due to small sample size compared to other studies in addition to other risk factors such as body position during lumbar puncture, needles and techniques that have been used and more than half of patients in both groups were females.

Post lumbar puncture headache in group (A) was relieved after 48 hours in most patients while post lumbar puncture headache in group (B) was relieved within 24-48 hours in most patients. Low back pain persists in the two groups of patients during hospitalization till discharge but it is intermittent.

This might be illustrated the effect of the nursing instructions brochure on nurses' performance (effective preparation and caring for patients pre, during and post lumbar puncture) that led to rapid relieve of post lumbar puncture headache in group (B).

Noninvasive management such as bed rest, fluids,

analgesics and caffeine only temporize the discomfort [28]. According to the study of (Moghtaderi et al. 2012) post lumbar puncture headache and discomfort are being improved in two days in the majority of patients [11].

Also, the effect of the nursing instructions brochure showed significant difference as regarding patients' satisfaction with nursing care pre, during and post lumbar puncture. Group (B) patients were more satisfied with nursing care provided than group (A) patients.

Patients' opinions regarding the nursing care they received have a great importance in the evaluation of the health care delivery system (Rahman et al. 2017) [29].

Similar results were found in the study of (Tang et al. 2013); patients were moderately satisfied with the nursing care they received [30] and the study of (Teng and Norazliah 2012) revealed that 82.7% of patients rated their satisfaction with nursing care provided to them [31].

## 5. Conclusion and Recommendations

Lumbar puncture is a serious procedure in neurosurgery performed mainly for diagnostic purposes. Before application of the nursing instructions brochure most nurses had unsatisfactory and inadequate level of knowledge and practice. All nurses had satisfactory level of knowledge and most of them had adequate level of practice post application of the nursing instructions brochure.

Patients received nursing care after application of the nursing instructions brochure were more satisfied with nursing care than patients received routine hospital care before application of the nursing instructions brochure. Competent nursing management reflected directly on improving patients' conditions; reduce or prevent complications, minimize patients' compliance and enhance proper recovery.

Nurses working in neurosurgery department should be qualified with increased knowledge base and possess both technical and interpersonal skills to ensure safe care. Nurse staff should specifically trained in the management of neurosurgery patients along with a subspecialty physician staff to improve the quality of care in neurosurgery and enhance patients' satisfaction with care provided. Plan for continuous educational and training programs periodically and regularly for all health care team is necessary.

## Limitations

Nurses were aware of their observations by the researchers. Small sample size for patients because lumbar puncture in neurosurgery department for diagnostic purposes not performed on a large number of patients.

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