

A study on the standard of documentation of lumbar puncture in neurology department of a major Irish Teaching Hospital in Ireland

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Abstract

Objective: Poor documentation following lumbar puncture (LP) had always been a matter of concern. This study aimed to investigate the documentation pattern of neurology house officers, registrars (Regs), and specialist Regs following LP in a major teaching hospital. **Materials and Methods:** Total hundred patient records were examined in the light of a carefully designed proforma containing 15 important indicators of good-quality LP documentation. **Result:** Mean number of indicators overall documented by doctors was found to be 6.24 ± 3.0037 . The mean number of indicators recorded by house officers was 5.11 ± 3.01 and Regs was 7.56 ± 3.28 . A total of 33% LPs were performed without a documented consent. Only 36% performers documented the type and size of needle they used during the procedure. Only 46% documents revealed the strength and name of the local anesthetic used. Statistically significant difference between senior house officers and Regs in terms of numbers of indicators documented was noted. **Conclusion:** The documentation standard among neurology junior doctors remained poor.

Key Words

Consent, documentation, knowledge, lumbar, neurology, puncture

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Introduction

First diagnostic lumbar puncture (LP) was performed in 1891. LP is a very common invasive procedure. The procedure can cause significant anxiety and adverse reactions in adult patients. Some of these adverse reactions can be potentially fatal, so proper documentation is very important. Previous studies demonstrated poor LP documentation and raised concerns over technical aspects and consent issues.^[1-3] However, very few studies were done on the LP documentation pattern of the neurology senior house officers (SHOs), registrars (Regs), or specialist Regs in Irish teaching hospitals. The primary aim of the study was to look for LP documentation standard in neurology inpatient ward and neurology day unit in Beaumont Hospital, a major teaching hospital in Ireland. The secondary aim of the study was to find if any lacuna were there in LP documentation both in neurology day unit and ward and to

rectify them in future to improve patient safety records and minimize adverse reactions.

Materials and Methods

The data were collected retrospectively from the neurology ward and neurology day unit of Beaumont Hospital over a period of 6 weeks. Based on literature review, a proforma incorporating 15 important indicators of good-quality LP documentation (proforma is attached for kind consideration) was designed for data collection.^[4,5] The opening pressure was not included in the proforma as in many circumstances LP was performed with very specific diagnostic aim (e.g., neurosarcoidosis, early dementia screen, and oligoclonal bands) especially in neurology day unit.

Records of a 100 adult patients (randomly selected) who had LP (irrespective of the number of LPs per person) were reviewed in the light of the 15 indicators of good-quality LP documentation. The source of data was patient records/notes. Any LP performed by the Acute and Emergency doctors was excluded from this study. Only successful LPs were considered for documentation check. LPs done fluoroscopically was also excluded from the study.

In our hospital SHO, Regs, and specialist registrar were

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assigned specific pagers/bleeps. Those bleeps were used to identify who performed the procedure, that is, SHOs or Regs. Regs and specialist Regs were kept in a single category "Regs."

Since LP needles with specific calibre or internal diameters had specific colour code so both documentation of colour of needle or gauge/calibre of needle were taken synonymously for documentation in the column "needle size." Routine LP results (like sugar, protein, and cytology) recorded within 24 h of LP were only considered under the column "result documented." Monday was taken as the deadline for documentation of result of LPs performed on Friday.

Microsoft XL 2010 was used for statistical calculation. *P* value less than 0.05 was taken as statistically significant.

Results

Out of the 100 patients who underwent LP 52 were female and rest were male. A total of 46 LPs were performed by Regs grade doctors or above and 54 were performed by SHO.

The mean number of indicators documented in the notes was 6.24 ± 3.0037 . The mean number of indicators recorded by SHOs was 5.11 ± 3.01 and Regs was 7.56 ± 3.28 . Mean age of the patients was 42.54 ± 15.35 years.

Documentations showed 66% LPs were performed with proper consent (written or verbal) [Figure 1]. Among those LP documentations with consent 58% were verbal consent, while only 8% had written consent for the procedure. Only 16 notes mentioned the exact indication for LP (diagnostic or therapeutic and if diagnostic what is the provisional diagnosis). Ten (10%) doctors noted down the presence or absence of any contraindication like bleeding disorders, warfarin therapy, or raised intracranial pressure.

Only 28% documents mentioned about the patient position (lateral position or sitting position) during the LP. Out of those 28 notes that documented the anatomical location of needle insertion 20 taps were done on supine lateral position while

8 were done on sitting position. Only two out of these eight patients were not tried in supine lateral position earlier. The commonest indication for LP in sitting position was the failure to obtain spinal fluid in supine position (six out of those eight cases). A total of 30 records did not reveal any note on if any sterility procedure adopted during the LP.

A total of 36% performers documented the type and size of needle they used during the procedure. 24 records showed the number of times LP was attempted. Out of these notes, 14 attempted many (>4) times, whereas 4 did on single attempt and 4 performers tried 3 times and two doctors tried 4 times [Figure 2].

Only 36% records showed the anatomical location of the LP needle insertion. A total of 46% documents revealed the strength and name of the local anaesthetic used and only 30% records mentioned the actual dose that was injected. A total of 50% performers recorded any patient complication during or immediately after the LP procedure like bleeding, pain, headache, and so on, while 54% documents contained notes on any procedural complication like blood stained fluid, uncooperative patient, and so on.

Around 56% records mentioned anything about postprocedural advice like lying flat on the bed, oral hydration, or any other immediate complications like vasovagal syncope, and so on. A total of 72% notes documented the cerebrospinal fluid (CSF) 24 h. Only 26% performers sent serum glucose and protein or albumin simultaneously.

The difference was statistically significant (*P* less than 0.05 was taken as significant) between SHOs and Regs in terms of numbers of indicators documented (two tailed *P* value was 0.0002).

A total of 15 junior doctors (SHO level) who worked in neurology during their clinical training in last 3 years were interviewed to assess their knowledge of LP documentation and ways for prevention of complications like postpuncture headache. A total of 12 out of this 15 (80%) were of the opinion that drinking plenty of fluids post LP and an average of 4 h of bed rest after LP were the best ways to minimize the incidence of headache. This was the reason they always instructed plenty of oral fluids and supine position after LP in their postprocedural note of patient's file. Only five (33%)

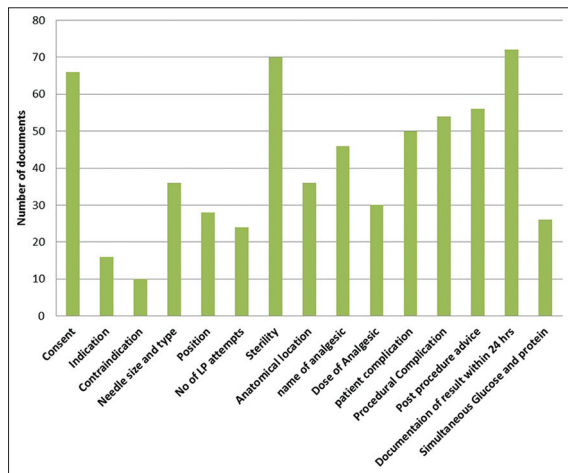


Figure 1: Parameters of lumbar puncture documentation in a major teaching hospital

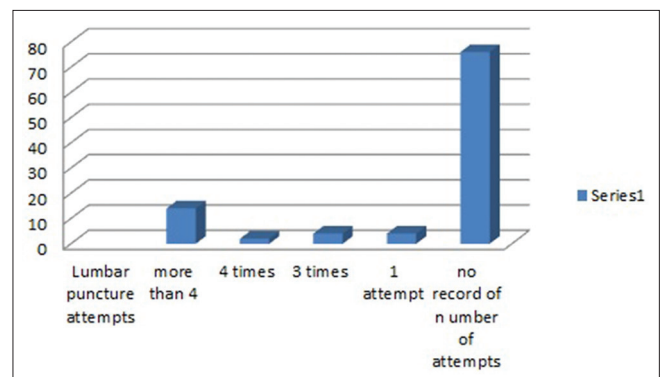


Figure 2: Number of lumbar puncture attempts

junior doctors thought that needle size was important as far as postdural puncture headache was concerned. A total of three doctors said repeated dural puncture could increase the probability of headache. Only 8 out of this 15 (53%) attended any official training course for LP and rest of them learned about the techniques from their senior Regs. Interestingly, 10 out of this 15 doctors admitted that an official LP proforma with all the important parameters would be beneficial for them. Only three (20%) complained of their busy schedule behind the poor documentation. Only three (20%) junior doctors had the idea that serum level of glucose, protein, and albumin could have any bearing upon the CSF level of the same and that was why it was of paramount importance to send paired serum glucose and protein sample with routine CSF biochemistry. None of the junior doctors had any idea of the guard position in assessing the bevel orientation [Figure 3].

Among the parameters that were considered and accounted for but not documented, all 15 admitted to have noted the LP needle size, name, strength, and actual dosage of local anesthetic they used but never felt it necessary to document in the patient's chart. All 15 of them claimed to have taken into account the indications and any obvious contraindications, anatomical position, and proper aseptic technique before doing LP but did not bother about documenting them. Only four (26.6%) counted the number of times they attempted on the patient when the number of attempts exceeded four.

Discussion

LP is usually a safe procedure but can result in a lot of complications if not done properly. The most commonly mentioned complications mentioned in literature after LP were headache, cerebellar herniation, low back pain, infection, local bleeding. Many of those complications were preventable. LP in a patient with raised intracranial pressure can result in cerebellar coning and death. Similarly, patient with bleeding diathesis or on warfarin can experience torrential bleeding after LP. So a proper screening of patients for contraindications like features of raised intracranial tension (mass lesion on brain imaging, papilledema, sixth cranial nerve palsy, etc) bleeding disorder, local infection is a must to avoid catastrophic consequences.

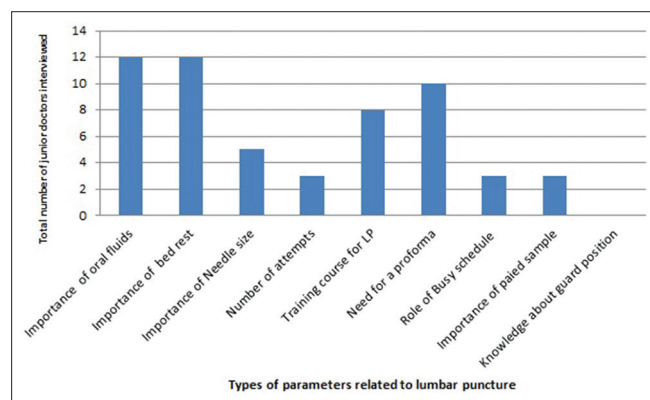


Figure 3: Knowledge and attitude of junior doctors who worked in neurology (n = 15) about various factors related to lumbar puncture

Larger needle size is a known factor in relation to headache after LP. One study documented that for diagnostic LP spinal needle size more than 22 G is not practically suitable. However, needle less than 20 G can result in headache in almost 70% of cases. So, 20 G or 22G LP needle is the ideal one for diagnostic spinal tap.^[6] Ahmed *et al.*,^[6] also suggested that lesser number of attempts of LP could lead to less incidence of headache as the dural fibre disruption will be less with fewer attempts. So, it is important to mention the needle size and number of attempts during LP for patient safety.

Role of bed rest and rehydration following LP to minimize headache was a controversial subject in the past. However, most recent evidences suggest that bed rest, oral fluids following LP have no impact on the incidence or duration of headache.^[2,6,7] However, bed rest for a small period of time can be beneficial in terms of monitoring of patient's vital signs or to tackle any immediate complications other than headache.

The complications of LP can be procedural or patient-related.^[8] These two types of complications are very closely interrelated. Common procedural complications include failure or dry tap, blood stained spinal fluid, and so on.^[8] Very rare procedural complications include fracture of spinal needle, dry tap due to very thin, or deformed needle or insufficient knowledge about the availability of longer size spinal needle in obese patients.^[9-11] Lack of cooperation can be an important factor, mostly in children. Common patient-related complications include headache, local bleeding, subdural hematoma, infection, back pain, and so on.^[1,2,3,8,12]

Sterility is a very important issue for all invasive procedures including LP. It was not possible to know whether maximum barrier precaution was adopted by the doctors while performing LP in our study. However, Black and Weinstein^[13] found on an informal survey that wearing mask or other maximum barrier precautions were less commonly adopted by internists or neurologists than anesthesiologists.

A total of 1% lignocaine was exclusively used local anesthetic in our hospital for LP for analgesia. However, because of wider safety margin of lignocaine overdose leading to neurologic and psychotic symptoms is not unusual.^[14] A case of serious 2% lignocaine-induced central nervous system toxicity was reported from Taiwan after local anesthesia.^[14] It is important to document the strength and dose of lignocaine for patient safety.

A European Federation of Neurological Societies task force recommended paired serum albumin or protein and serum glucose with LP to improve diagnostic yield. This task force preferred CSF albumin and serum albumin ratio over total protein.^[15] Glucose is actively transported across blood-brain barrier, so paired serum and CSF glucose must be measured to avoid erroneous interpretation of CSF results in isolation.^[15]

Hewett and Counsell^[4] revealed that documentation following LP was poor in acute setting, only 32% of LP s had recording of position of patients and only 42% had appropriate LP results documented. Around 72% mentioned about aseptic technique and 11% about needle size. Only 30% had serum glucose sent simultaneously. Baker and Counsell^[16] conducted a reaudit in Scotland which revealed only 44% LP s documented a

consent, while 33% documented patient position while LP. They found only 31% documents included the needle size. However, 83% mentioned about aseptic techniques. Similar poor documentation after LP was observed by Taitz *et al.*,^[8] among pediatric physicians.

Lack of awareness, knowledge, and proper training were probably major factors for poor documentation by SHOs in our study. Lack of awareness or knowledge as a factor was not probably uniformly applicable for Regs and specialist Regs as many of them were highly experienced in this procedure. Sloppiness, inertia from previous practices, and dearth of formal hospital LP documentation proforma were possibly common underreported factors for both SHOs and Regs. Time constraint was probably not an issue, as our study excluded spinal taps done in emergency department.

Inadequacies in documentation can be a consequence of lack of training and experience in proper understanding of clinical research and documentation requirements (both for patient safety and legal safety of physicians).^[17] Cabana *et al.*,^[18] revealed 293 potential barriers behind why doctors did not follow clinical practice guidelines. Lack of awareness, unfamiliarity, and agreement were few of them.

The major limitation of our study was small number of cases and single center-based approach. We also interviewed only a small number of junior doctors and did not interview doctors of Reg grade and above to find out the causes behind poor documentation habit. Multicenter study involving all major teaching hospitals over Ireland and larger number of samples can provide a better insight into the magnitude of problem regarding LP documentation pattern and help design a proper approach. The poor documentation is not only a risk to the patient, but also can be a potential threat to doctor's professional career.

One previous study revealed that introduction of LP sticker and training session on manikin led to significant improvement in documentation among junior doctors.^[12] Likewise, we have a plan to conduct sustained and intensive LP training sessions on manikin among junior doctors along with an awareness campaign regarding the risk of poor documentation both for patients safety and doctor's professional career. We have a plan to introduce a LP proforma or sticker as an official hospital policy and also in the hospital web site. Screening of patients as per proforma before the procedure and completion of the proforma must be made mandatory after the LP. A fortnightly or monthly email reminder of the proper guidelines to the doctors can be an effective way of ensuring adherence. We also would like to include the LP proforma in junior doctors' induction or appointment pack. Only a multipronged strategy can be successful to improve the documentation habit among the junior doctors like SHOs and Regs.

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