

# Improving Patient Safety of Acute Care Lumbar Punctures

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## Abstract

Lumbar puncture (LP) is a common invasive procedure in the acute medical setting but is not without its risks and complications, making best clinical practice and correct documentation important for patient safety. Previous audit revealed poor levels of consistency in technique and documentation in the acute medical setting, highlighting it as an area for improvement.

This project aims to identify current levels of documentation and improve upon these through the departmental education and the introduction of a documentation tool to create a safer clinical environment for LPs. Gold standards in clinical practice were identified through literature review and national guidelines, establishing 15 key parameters as essential areas for documentation.

Patient notes were retrospectively analysed after LP over a two month period to identify levels of documentation in these areas, and the clinical technique used. Results of this initial audit were presented to the department along with an education session regarding current evidence based best practice for LPs and the important aspects relating to patient safety. A documentation tool was also introduced. A re-audit was then performed of the same parameters and assessing the use of the documentation tool.

Results showed a significant increase in overall documentation from 44% up to 95% after intervention, with 85% of cases using the new proforma. We can conclude that the introduction of a documentation tool and departmental education has significantly improved upon LP documentation in the acute medical setting. This is important for both the protection of medical professionals, as well as patient safety and quality of care, and could be implemented in other clinical environments.

## Problem

This audit was carried out within Cheltenham General Hospital (CGH), part of the Gloucestershire NHS Trust in England. Lumbar punctures (LPs) are a common procedure in the acute care department (ACUC) at CGH, usually being performed by middle grade physicians after being trained by seniors.

Previously there was no set method of documenting the LP procedure and consistency was thought to be poor. As staff within the department work on a shift rota with a high turn over of people, there had been some episodes of miscommunication over the procedure and results. It was often difficult for future staff to interpret what had been done, with different elements of the procedure (such as checking contraindications) and results not being documented in a consistent format or location within the notes. This highlighted the documentation of LPs as an area of improvement for both patient safety, to ensure physicians were checking all contraindications and consenting correctly, as well as clinical practice within the team.

## Background

The first lumbar puncture (LP) was performed in 1891 by Quincke in order to relieve raised intracranial pressure in children with tuberculous meningitis.(1)

LP has since become a common invasive procedure to analyse

cerebrospinal fluid (CSF) in the acute medical setting. This procedure does not come without its risks and complications, making documentation an important aspect of the process for protection of both the patient and physician.

In other areas of medicine, the use of proformas has been shown to improve the quality of documentation and triggers elements of the procedure to be considered by the physician. This makes it much easier for other team members to reflect on the procedure and creates consistency in clinical practice.

## Baseline measurement

15 core areas for best practice of lumbar puncture were established using literature review and Royal College of Emergency Medicine guidelines.(2,3) These were then used as the standards for optimal documentation. These were:

- Indication
- Any contraindications
- Consent
- Patient position
- Sterility
- Anaesthetic type

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- Anaesthetic dose
- Procedure site
- Needle size or type
- Number of attempts
- Opening pressure
- Any complications
- Post-procedure advice given
- Results documented
- Physician name and grade.

Patient notes were retrospectively reviewed after lumbar puncture over a two month period to establish the documentation of each of these parameters, with the ideal standard set at 100%.

It was found that overall, documentation levels were poor as expected, at 44% average across all of the parameters. Some areas of particular concern were those of "contraindication to the procedure", "patient position", and "post-procedure advice given", which had a 0% documentation rate.

See supplementary file: ds3389.docx - "The Final Documentation Tool"

### Design

An initial audit that documentation levels were poor and leading to areas of confusion, so it was highlighted as an area for improvement. The concept of a documentation tool was discussed with colleagues within the department. Consultants and middle grade physicians, who most commonly carry out the procedure, advised upon areas they felt were important to include in documentation. Through talking to various physicians and observing the procedure, I came to realise that there was not a standard way in which LPs were performed, and that many people used their own techniques, not all of which were in line with current best practice. I therefore thought it would be important to include a teaching session into my intervention on current guidelines and best practice.

Due to the shift nature of the workforce in ACUC, one area of potential problem was ensuring the whole team were educated and aware of the interventions. I aimed to overcome this by introducing the documentation tool and a brief outline of the reasoning at daily hand over. In the future, this could be done at departmental induction before trainees begin on their rotation, ensuring that everyone attends.

### Strategy

The initial audit was presented at departmental teaching, along with a teaching session on the procedure, current best practice, and the importance of documentation. An initial draft documentation tool was created and introduced to the departmental doctors. Subsequent 'Plan, Do, Study, Act' (PDSA) cycles were used to establish the final documentation tool design.

#### PDSA cycle 1:

The initial draft documentation tool was introduced to the ACUC department for a one week period. Feedback was then collected during a departmental meeting to establish thoughts and improvement areas from the users. A main factor that was criticised was the location of the forms, which had not been well publicised and was not obvious to the physicians, thus creating a negative impact on use. Also asked for was a clearer description of the needle type used such as 'Whitacre' and 'Quincke', and for the addition of areas to document the level of aseptic technique used and the tests sent for. Despite these not being part of the key areas contained within the audit, it was felt these were useful areas to know and for staff to be aware of what tests results to chase.

After acknowledging the feedback, the documentation tool was appropriately modified to create a second draft.

#### PDSA cycle 2:

The second draft documentation tool was then reintroduced to the ACUC department in a well known location on the LP equipment trolley. Another week of use was given before meeting with departmental colleagues once again. This provided mainly positive feedback on the modified proforma, with much more enthusiasm to use the tool now that it was felt easier to find. The change highlighted was that the area for documenting the patient details was not large enough to contain a hospital sticker, which was often the easiest way of transferring this information. This area was subsequently re-designed to be compatible with hospital stickers.

This final documentation tool was then introduced to the department. A re-audit was performed over a two month period, looking at the documentation levels of the initial core parameters and also the level of use of the documentation tool.

### Results

A total of 11 cases were retrospectively reviewed over a two month period to establish the initial level of documentation. This was found to be poor, as expected, averaging 44% across all the key parameters.

After the action plan had been implemented with departmental teaching and the introduction of a documentation tool, the overall level of documentation was found to dramatically increased to an average of 95%, with 82% of reviewed cases using the new documentation tool.

Those that did use the documentation tool had even better levels of documentation than those that did not, highlighting the importance

of the proforma as a stimulus for the procedure.

Cases using the proforma reached a 100% level of documentation across 14/15 key parameters, with the exception being the 'dose of anaesthetic' used, which although vastly improved, was only documented in 78% of cases. One possible reason for this is in the design of the proforma, making it easy to overlook this parameter.

See supplementary file: ds3284.png - "Graph showing documentation levels of the core areas before and after implementation of the documentation tool"

## Lessons and limitations

Introduction of the documentation tool and departmental education vastly improved the documentation of lumbar punctures in acute medicine. As well as this, feedback from staff was positive for clarifying reflection on the procedure and results and prompting them to check necessary areas prior to the procedure.

This project has shown that there are inconsistencies in both technique and documentation of LPs and has supported documentation proformas as a way of standardising these areas.

One problem encountered was ensuring the whole department was educated on the topic and aware of the proforma, given the shift patterns of staff. This was partly overcome through separate informal introductions at handover over a week long period. However, it may still have been a factor in the few cases where the documentation tool was not used after introduction.

In the future, the documentation tool is due to be created on a more hospital wide basis by the trust, and will be introduced at departmental induction, along with a small teaching session on practical lumbar puncture technique. This will ensure that everyone receives the same level of education and awareness.

## Conclusion

Lumbar puncture documentation levels have been significantly improved through the introduction of a documentation tool and departmental education in the acute medical unit. This is an important process for optimising clinical practice, team communication, and patient safety, and is a method which will now be implemented across the hospital and could be considered for other acute units.

## References

1. Quincke H. Lumbar puncture. In: Diseases of the nervous system, Church A. (Ed), Appleton, New York 1909. p.223.
2. Hewett R, Counsell C. Documentation of cerebrospinal fluid opening pressure and other important aspects of lumbar puncture in acute headache. *Int J Clin Pract* 2010;64:930-5.
3. Rolinski M, Rowe H. Documentation of lumbar punctures-Neurology DIU .2013. Available from: <http://www.rcplondon.ac.uk>.

## Declaration of interests

None declared

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