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Training Advanced Nurse practitioners (ANP's) to perform Lumbar Puncture's within the Acute Medical Unit (AMU)

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Introduction

NHS improvement (2016) highlighted the difficulty with recruiting doctors to general medicine, resulting in significant shortages for generalist posts. At the start of the millennium the Chief Nursing Officer highlighted 10 key roles for nurses (Department of Health 2000) aimed at using the knowledge, skills and expertise of nurses to develop proficiency in alignment with the NHS Plan.

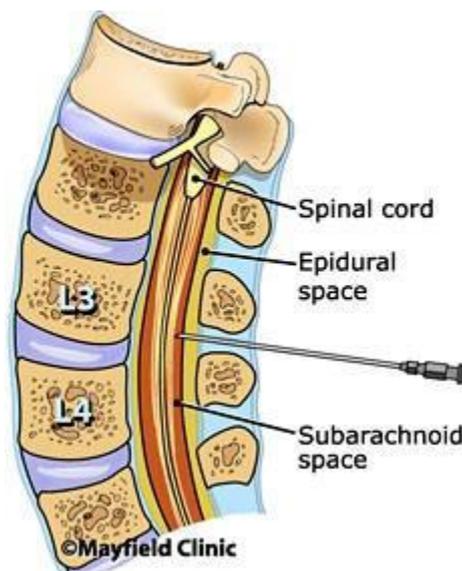
The NMC (2007) recognised the changes in practice where nurses are;

'undertaking treatment and care that was once the domain of other health care professionals, notably Doctors'.

Exploring new ways of working aims to bridge the gap exposed in light of the reduction in junior doctor's workload (European Working Times Directives). Performing a lumbar puncture (LP) is one of those skills previously thought to be the role of the junior doctor.

Background

A lumbar puncture is a procedure used to obtain a sample of cerebrospinal fluid (CSF), by the insertion of a hollow needle into the spinal canal.

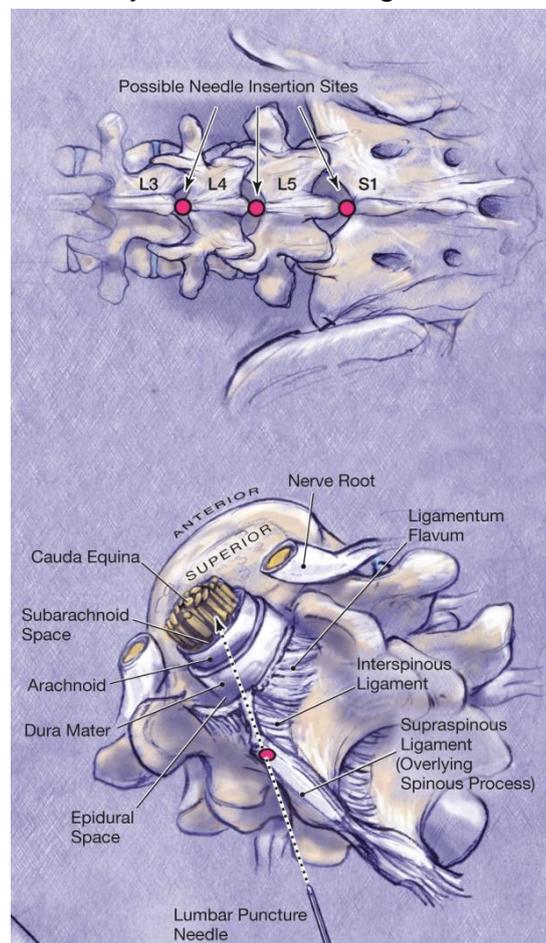


Cerebrospinal fluid (CSF) is a clear, colourless fluid that supports the brain and spinal cord. It is produced by the body constantly, so the small amount removed during an

LP is rapidly replaced. The changes in the CSF can help diagnosediseases of the brain and nervous system, such as a sub-arachnoid haemorrhage, central nervous infections such as meningitis and encephalitis, or other neurological conditions such as multiple sclerosis (Ahmed et al 2006).

LPs are performed frequently in acute medical units, particularly for patients who present with sudden onset severe headache, also known as 'thunderclap', when computed tomography (CT) scans of the head are reported as normal. LPs are then needed to check for the presence of xanthochromia in the CSF. Xanthochromia is a yellow discolouration that highlights the presence of bilirubin and is used to detect a small bleed into the sub-arachnoid space. Small bleeds may not be seen on CT scan as diagnostic sensitivity of CT scanning is not 100%, but if missed can be catastrophic. Correct technique, specimen handling and interpretation of CSF results are critical for an accurate diagnosis (Bederson et al 2009).

Successfully performing an LP is a highly technical skill and relies on being able to correctly identify underlying spinal anatomy and direct the spinal needle through the muscle layer and between facet joints, in order to get to the sub-arachnoid space.



This skill is well known to have a high failure rate and can be uncomfortable for the patient who may have to undergo multiple attempts. Doctors often learn common practical procedures like LP's 'on the job', this results in patients experiencing less than optimal care and more complications than necessary (Defres et al 2015).

LP's can be haphazard, requiring a competent practitioner. Consequently there are often delays in performing them as a result (Cooper. N 2011).

Advanced Nurse Practitioners (ANP's) employed on the AMU wished to train to independently perform this procedure, as part of their role. The intended benefits being to;

- **Produce a core group of available AMU staff who were skilled at performing diagnostic lumbar puncture.**
- **Reduce the risk of failed procedures and therefore multiple attempts at obtaining CSF.**
- **Ensure the availability of a key set of experienced ANP's to train and support junior doctors learning the skill.**
- **Provide a standardized approach to training and education**
- **Ultimately enhance patient care by improving the patient experience whilst positively impacting on length of stay and patient flow.**

Method

The Nursing and Midwifery Council (NMC) Code of Conduct, Performance and Ethics (NMC, 2008) state that advanced nurse practitioners need to be familiar with the NMC Code and the expectation that they take responsibility and are accountable for their own actions, recognise and act within the limits of their competence and the boundaries of their own practice.

To ensure a robust pathway to becoming experienced practitioners who could perform diagnostic lumbar puncture both safely and independently, the ANP's identified a need to develop a specific competency framework. This document would provide evidence that the ANP's had undergone the required training, education and skills practice, in order to perform LPs without direct medical supervision. It would also provide a framework for colleagues who may join the team in the future, to work through, and could also be developed for a wide range of advanced clinical skills that may further improve patient experience within AMU.

The competency framework could be used as a resource and a record of learning, which may then be entered into a personal profile/portfolio and used for revalidation. For the knowledge and skills to be at the appropriate level, support was sought from an appropriate medical doctor of a designated seniority that was deemed competent at the extended role being assessed.

In order to show evidence of competence, the ANPs needed to be able to;

- **Demonstrate knowledge and understanding of the relevant anatomy of the lumbar spine and surface area.**

- Correctly identify the intervertebral space at L_{2/3,3/4} and L_{4/5}
- Demonstrate knowledge and understanding of the pharmacology of the local anaesthetic used in current practice.
- Demonstrate the ability to explain the procedure to the patient at a level of their understanding.
- Demonstrate the ability to prepare the patient and equipment, and perform the procedure in a safe and efficient manner. Including knowledge and understanding of the potential complications, should they occur.

The practical technique was taught by attending the clinical skills medical training session for foundation doctors. This relied on a demonstration of the procedure on a model and then the ability to practice on the model whilst in a safe environment, and avoiding direct patient harm. Further practical experience was gained by observation of at least five LP's performed in the clinical area, following which the ANP's could practice under direct medical supervision. Each supervised procedure was assessed and documented on an assessment form based on the medics' direct observation of procedures skills forms (DOPS). Knowledge of anatomy and pharmacology relied on independent study but was verified in the form of a viva and ongoing questioning during supervised practice.

After successfully performing at least five LP's with little or no supervision, the final clinical competency was assessed by observation from an AMU Consultant or named medical trainer, competent at performing the skill.

Once the ANP's could demonstrate evidence of successfully completing the required practical training, underlying theory and minimal supervised practice, the evidence was signed off in a competency assessment record and the ANP's were free to practice the skill independently.

(fig 1)

Discussion

LP is a clinical skill that junior doctors must gain as part of their medical training, consequently the AMU doctors would also ask to practice performing LP's when needed; this made it difficult to gain experience quickly. However, now having gained expertise the junior doctors have an easily accessible source of supervision from the ANP's. This in turn means that patients are not waiting for long periods before an LP can be attempted and also it is less likely to result in multiple attempts. This has been demonstrated by a recent ANP audit which showed a 40% increase in the number of LPs performed in the same three month period between 2015 and 2017, but a 12 % reduction in multiple attempts per patient, with 75% of patients only having one attempt at successfully performing LP in 2017, compared to 63% in 2015. This led to, on average, a 12 hour reduction in length of stay.

Consideration was also needed regarding the administration and prescription of local anaesthetics. All ANP's were independent non-medical prescribers and therefore it was agreed to add lidocaine 1% and 2% to the AMU ANP's formulary. However, adding medications to the ANP formulary was a slow process requiring re-submission

to the trust's Drugs and Therapeutics committee. This led to a delay in being fully independent to perform LPs. It was also inconvenient getting the lidocaine prescribed by medics whilst waiting for the formulary to be changed.

Another factor was the ability to gain informed consent from the patient to perform the procedure. This required formal training and a competency based assessment by the ANP lead consultant. Records of competency were also required to be held at trust level, within the Clinical Governance department. Milner-Keane (2003) emphasised the importance of the patient being central to their health and well-being decision making. They define informed consent as the ability to understand the information being offered and make a decision based on the given information. Since no written information at trust level was available, a patient information leaflet (fig 2) was made to aid the patients decision making process and to safeguard true informed **Consent**

Whilst training to perform LPs, during practical observation and subsequent audit, the ANPs found that documentation of the procedure was poor. Records missed dates/times, were often illegible, there were inconsistencies in what was documented, and on one occasion omitted that the procedure had actually been performed. Documentation of informed consent was also inconsistent, with 73% of patients having inadequate consent documented and only 8% completing a trust consent form.

To improve documentation a lumbar puncture checklist was devised following a review of other similar structured proformas found in medical literature (fig 3) (Broderick et al 2014). This was to ensure best practice was followed to protect both the practitioners and the patient undergoing an invasive procedure and to guarantee that each procedure was well documented within the patient's medical notes. Unfortunately a second audit has found that the proforma is not in regular use. It is hoped that this will improve trust wide as the proforma has recently been attached to the LP CSF specimen packs issued by the pathology laboratory.

Conclusion

Continued re-audit will be ongoing to re-evaluate current practice and further improve patient experience of lumbar puncture within AMU/AEC. This should in turn help reduce patient waiting times for LP and therefore length of stay. The AMU ANPs keep a logbook of procedures that they have undertaken and supervised, as evidence of continued practice. These logbooks may also be used for future audit. In order to ensure these procedural skills remain up to date the ANPs are currently discussing alternatives such as case-based discussion and/or intermittent observation of practice with our medical supervisors.

There are currently two ANP's on the acute medical unit and ambulatory emergency care who regularly perform lumbar punctures and have further developed expertise in this skill. Consequently they are requested for particularly anxious patients, likely

difficult or previously failed LPs and for patients who need frequent therapeutic taps for idiopathic intracranial hypertension. The ANPs have proven to be a resource to supervise and train the junior doctors with this skill, not just in the clinical environment but also by teaching on the trusts medical clinical skills courses. The AMU has two trainee ANPs who, following successful completion of their training, will also train to develop competency in performing lumbar puncture. With a third ANP currently being recruited, this will guarantee the AMU pool of experienced practitioners to perform LP with minimal complications; and support our medical colleagues with their clinical skills training.

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Nursing and Midwifery Council (2008) NMC Code of Conduct
<https://www.nmc.org.uk/standards/code/>

Figure 1.

Date	
ANPs Name	
NMC registration number	
Assessor's Name	
Assessor's GMC registration number	
Assessor's position	
Clinical setting	
Procedure	

Demonstrates understanding of indications, relevant anatomy, and technique for procedure;

Observed	Assisted	Performed under Supervision	Performed with limited supervision	Performed Independently

Obtains informed consent;

Observed	Assisted	Performed under Supervision	Performed with limited supervision	Performed Independently

Demonstrates appropriate preparation pre-procedure;

Observed	Assisted	Performed under Supervision	Performed with limited supervision	Performed Independently

Appropriate analgesia or safe sedation;

Observed	Assisted	Performed under Supervision	Performed with limited supervision	Performed Independently

Technical ability

Observed	Assisted	Performed under Supervision	Performed with limited supervision	Performed Independently

Aseptic technique

Observed	Assisted	Performed under Supervision	Performed with limited supervision	Performed Independently

Seeks help where appropriate

Observed	Assisted	Performed under Supervision	Performed with limited supervision	Performed Independently

Post procedure management

Observed	Assisted	Performed under Supervision	Performed with limited supervision	Performed Independently

Communication skills

Observed	Assisted	Performed under Supervision	Performed with limited supervision	Performed Independently

Consideration of patient/professionalism

Observed	Assisted	Performed under Supervision	Performed with limited supervision	Performed Independently

Overall ability to perform procedure

Observed	Assisted	Performed under Supervision	Performed with limited supervision	Performed Independently

Based on this observation please now rate the level of independent practice the ANP has shown for this procedure;

Unable to perform procedure	
Able to perform procedure under direct supervision	
Able to perform procedure with limited supervision	
Competent to perform procedure independently and deal with complications	

Assessor's signature	
ANP's signature	

Figure 3.



Lumbar Puncture Checklist

PATIENT IDENTIFICATION LABEL

Indication.....Date/Time:...../...../.....:..... MRI/CT Brain performed Yes <input type="checkbox"/> No <input type="checkbox"/> Date:/...../..... Images reported/reviewed? Yes <input type="checkbox"/> No <input type="checkbox"/> Contraindications (see trust clinical guidelines) Yes <input type="checkbox"/> No <input type="checkbox"/> Platelet count >80 Yes <input type="checkbox"/> INR <1.5 or clotting normal Yes <input type="checkbox"/> Patient on clopidogrel or anticoagulant treatment discussed with senior? Yes <input type="checkbox"/> N/A <input type="checkbox"/> Allergies.....
Does patient have capacity to consent Yes <input type="checkbox"/> No <input type="checkbox"/> Informed verbal consent obtained <input type="checkbox"/> / Written consent <input type="checkbox"/> Best interests <input type="checkbox"/> Procedure explained and risks (headache, bleeding, infection, failure, back pain, nerve injury) Yes <input type="checkbox"/> No <input type="checkbox"/> (give patient information leaflet) Others present during procedure.....
Aseptic technique throughout- Yes <input type="checkbox"/> No <input type="checkbox"/> Position: Lateral <input type="checkbox"/> Sitting <input type="checkbox"/> Lidocaine instilled:ml of.....% Spinal needle gauge: 22G (best practice) other..... Number of attempts:..... Successful space: L2/3 <input type="checkbox"/> L3/4 <input type="checkbox"/> L4/5 <input type="checkbox"/> For unsuccessful LP attempts, please contact the Interventional Radiology Department on extension 2368 for a fluoroscopic guided lumbar puncture procedure
CSF Appearance: Clear and colourless <input type="checkbox"/> Other..... Opening pressure:.....cmH2O Estimated Volume of CSF taken:.....ml
<p>SAMPLE Requests (ALWAYS Contact RLHU Micro Lab 4900 – OUT OF HOURS call switchboard and ask for the Microbiologist on call if required and bleep the Biomedical Scientist on 4663 to inform)</p> <p>MCS <input type="checkbox"/> Protein, glucose <input type="checkbox"/> Xanthochromia (call 5544) <input type="checkbox"/> Viral PCR <input type="checkbox"/> TB <input type="checkbox"/> Cytology <input type="checkbox"/></p> <p>Additional requests eg Plasma Oligoclonal bands (Mustard tube - Walton Lab)..... <input type="checkbox"/></p> <p>PLEASE ENSURE THAT THE TESTS ARE ALL REQUESTED ON THE RELEVANT FORMS.</p>
Paired serum protein and glucose sent at same time as LP? Yes <input type="checkbox"/> No <input type="checkbox"/>
If procedure complications state..... Advised staff: Lie patient flat 1 hours /neuro obs/ vital signs/ fluids/ analgesia for headache or backache/ observe puncture site <input type="checkbox"/>
NAME..... SIGNED..... GRADE..... DATE..... ...