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### Surgical audit of Neurosurgery Patients Admitted to a Tertiary Care Hospital in Terms of Record and Documentation

<sup>1</sup>Dr. Mateen Ahmad, <sup>2</sup>Dr. Sami Ullah, <sup>3</sup>Dr. Muhammad Zohair, <sup>4</sup>Dr. Ahsan Sajjad, <sup>5</sup>Dr. Marwa Munir, <sup>6</sup>Dr. Durdana Ghaffar

<sup>1</sup> St Luke's Hospital Kilkenny, Ireland

<sup>2</sup> Senior Registrar, Paediatric Surgery, Naseer Teaching Hospital, Peshawar KPK, Pakistan

<sup>3</sup> Institute of Kidney Disease, Hayatabad, Peshawar, KPK, Pakistan

<sup>4</sup> Armed Forces Institute of Cardiology AFIC, Rawalpindi, Pakistan

<sup>5</sup> Surgical C Ward Khyber Teaching Hospital, Pakistan

<sup>6</sup> Resident Surgeon, Hayatabad Medical Complex, Peshawar, Pakistan

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Corresponding Author: **Dr. Muhammad Zohair**

#### Abstract

##### Objectives

The aim of performing this audit is to observe and analyze record keeping and documentation of all the patients admitted to neurosurgery department in a tertiary care hospital in Peshawar Khyber Pakhtunkhwa Pakistan.

##### Materials and Methods

The audit cycle was conducted in a retrospective manner and data pertaining to all the admitted patients in neurosurgical department was collected from January 2018 to December 2022. A total of 1305 patients were enrolled in this audit admitted through OPD and emergency. The variables that were included in the audit cycle are the following: Name, age, gender, date of admission, medical record number (MR number), disease and the treatment given. Data was collected in a pre-designed proforma, added to Microsoft excel sheet and analyzed through SPSS software version 23.0. The data was described in the form of

description, charts and tables.

##### Results

Out of 1305 patients enrolled in the study, we noticed that 1244 patient's (95%) names, 1079 (82.7%) hospital registration numbers, 1208 (99.5%) dates of admissions/discharges, 1252 (96%) genders and 99% of the diseases and procedures done were properly recorded. No record was available related to the address, contact numbers and occupations of the patients.

##### Conclusion

Despite having a few deficiencies, it is safe to conclude that most of the data pertaining to neurosurgery patients was properly recorded and kept in follow-up as shown by the results. We call attention to conducting audits on a regular basis that will further cover up the loopholes in data alimentation and improve our catalogue even further.

**Keywords:** Neurosurgery, Audit, Admissions

#### Introduction

Audit, in English language, basically means an on-site verification activity such as inspection or examination of a process or a quality system to ensure compliance to standard requirements<sup>[1]</sup>. In Health care, this process involves the investigation of clinical practice and institutional systems and comparing against given or accepted standards<sup>[2]</sup>. There are various types of audits utilized for the better functioning of global health infrastructure which include external, internal, standards, financial and operational audits.

A surgical audit is conducted to improve all aspects of surgical practice by performing a systematic, unbiased and critical analysis of the quality of surgical care<sup>[3]</sup>. Audit is a fundamental part of modern surgical practice<sup>[4]</sup>. From consultant to trainee, involvement in auditing is desirable and is increasingly becoming compulsory. There are various methods by which audits can be done in surgical departments such as looking into patient records, assessing pre-operative and post-operative care, analyzing

the performance of surgical residents and holding mortality, morbidity meetings etc. Surgical audit is a quality improvement and educational activity grounded in everyday practice. Audit and feedback help participants analyze their performance and plan effective responses to improve surgical performance. Research shows that audit and feedback are effective educational strategies [5]. Audit results can be used to conduct essential research, which can be projected onto the whole community, and it judges the performance of the surgical team and their procedures as well [6-7]. Since surgery is a controlled trauma, it is challenging to perform audits in surgical practice therefore the only method is to analyze outcomes testing various variables. A good surgeon must never hide his/her faults but should learn from them to serve better his patients and improve his practice. Specifically in neurosurgery's there is no literature demonstrating a direct link between neurosurgical checklists and patient safety [8]. This audit aims to report on the number of surgeries performed in a tertiary care public sector hospital and considering the outcome improvement that can be done in providing health care.

**Materials and Methods**

After taking the hospital ethical and audit committee into confidence and maintaining all the rules and regulations related to conducting a clinical trial, this observational retrospective study was begun in the neurosurgical department of a tertiary care hospital in Peshawar Khyber Pakhtunkhwa. The audit comprised of 1303 patients from both genders and belonging to all ages which were added to the study through consecutive non-probability sampling. The study duration was 6 months and data from January 2018 to December to 2022 was kept in perspective. Data was collected on a pre-designed Performa from the emergency, elective theater, wards, high dependency unit and intensive care units. The variables that were included in the audit cycle are the following: Name, age, gender, date of admission, medical record number (MR number), disease, the treatment given, elective services, emergency services and calls to neurosurgery from other departments. Inclusion criteria had patients related to neurosurgical wards and patients from other units and departments were excluded from the study. The data was entered from proformas to Microsoft Excell sheet and then transferred to SPSS version 23.0 for analysis. The results were depicted in the form of description, tables and charts.

**Results**

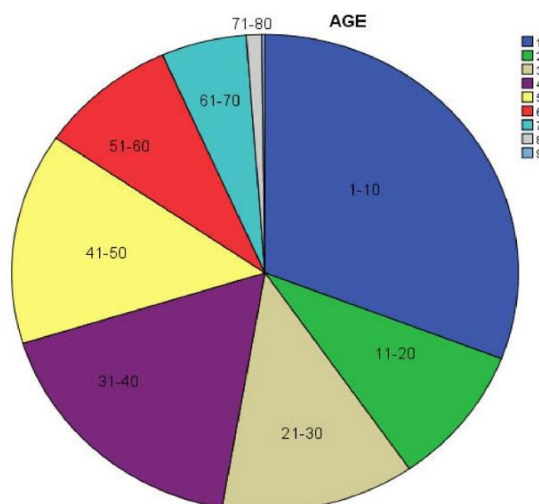
A total of 1305 patients were enrolled in this audit admitted through OPD/emergency and falling within the time frame from January 2018 to December 2022. The main aim of this audit was to assess and analyze the documentation of biodata of all the patients admitted to neurosurgery department, within the time frame as mentioned above, with reference to name, age, hospital registration number, gender, date of admission/discharge, disease and the treatment given accordingly. We noticed that 1244 patient's (95%) names were properly recorded with correct spellings and the rest of the names were missing, however the case data was available. Hospital

registration numbers were allotted to 1079 (82.7%) patients and the rest of the numbers were not documented (n= 226, 17.3%). In terms of gender, we had 563 (43.1%) female patients and 689 (52.8%) male patients in the sample and gender identity was not mentioned for 53 (4.1%) cases in the list. Date of admission/discharges were cataloged for 1208 (99.5%) patients as opposed to seven cases (0.5%), hence showing good compliance. For age, it was observed that 1011 (77.5%) patients had their ages mentioned in the data while it was found missing for 294 candidates (22.5%) and the age ranges have been stratified for simplicity as shown in Table1 and pie chart 1. No record was available related to the address, contact numbers and occupations of the patients. Abridged illustration of all the variables has been shown in Table 3 and bar chart 1.

Various diseases and conditions were encountered during this tenure: Only 3 cases were found missing, and the rest were properly documented. The five most common pathologies noticed were hydrocephalus (15.4%), myelomeningocele (6.5%), L4-L5 stenosis (7.8%) prolapsed intervertebral discs (PIVD) at levels L4-L5 (11.7%) and L5-S1 (11.5%). The complete details are shown in Table 2. As far as treatment and management is concerned, the five most prevalent procedures were resection of the tumor/lesion (15.6%), laminectomies (32.4%), fenestration and discectomies (5.6%), myelomeningocele repair (5.9%) and ventriculoperitoneal shunts (18.6%). The details are illustrated in Table 4.

**Table 1:** Stratification of Age of the patients

| Range        | Frequency | Percentages |
|--------------|-----------|-------------|
| 1- 10        | 312       | 23.9        |
| 11-20        | 96        | 7.4         |
| 21-30        | 125       | 9.6         |
| 31-40        | 177       | 13.6        |
| 41-50        | 145       | 11.1        |
| 51-60        | 89        | 6.8         |
| 61-70        | 55        | 4.2         |
| 71-80        | 10        | 0.8         |
| 81-90        | 2         | 0.2         |
| Missing data | 294       | 22.5        |
| Total        | 1305      | 100         |



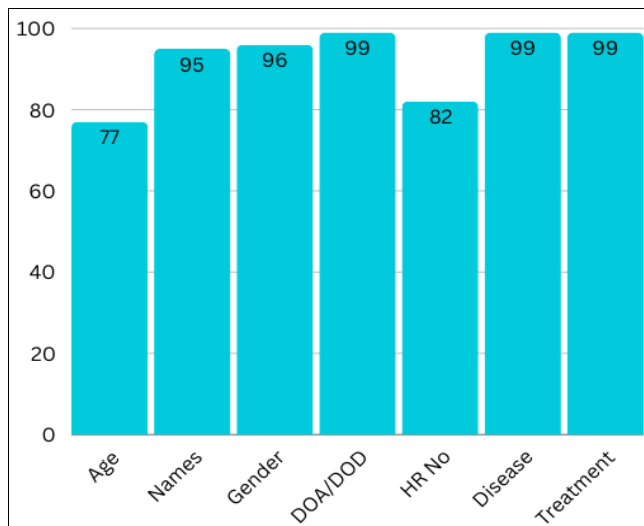
**Pie chart 1:** Age distribution of all the patients

**Table 2:** Demographics of the type of procedures done

| Procedure                        | Frequency | Percentage |
|----------------------------------|-----------|------------|
| Laminectomy                      | 424       | 32.5       |
| Burr hole aspiration             | 1         | 0.1        |
| Burr hole evacuation             | 26        | 2          |
| Carpal tunnel release            | 7         | 0.5        |
| Conservative Managment           | 1         | 1          |
| Corpectomy                       | 2         | 0.2        |
| Cranioplasty                     | 4         | 0.3        |
| Craniotomy                       | 64        | 4.9        |
| Craniotomy/biopsy                | 2         | 0.2        |
| Craniotomy/evacuation            | 4         | 0.3        |
| Debridement/wash                 | 11        | 0.9        |
| Discectomy                       | 2         | 0.2        |
| Drainage of abscess              | 18        | 1.4        |
| Elevation of skull fracture      | 5         | 0.4        |
| Endoscopic third ventriculostomy | 1         | 0.1        |
| Excision of tumor                | 4         | 0.3        |
| Exploration/repair of nerve      | 12        | 0.9        |
| Fenestration/discectomy          | 73        | 5.6        |
| Fenestration of arachnoid cyst   | 5         | 0.4        |
| Foramen decompression            | 1         | 0.1        |
| Infected flap removal            | 1         | 0.1        |
| Infected shunt removal           | 1         | 0.1        |
| Lumboperitoneal shunt (LP)       | 6         | 0.5        |
| Myelomeningocele repair          | 77        | 5.9        |
| Nerve repair/anastomosis         | 2         | 0.2        |
| Removal of bone/duraplasty       | 1         | 0.1        |
| Removal of TPF                   | 3         | 0.2        |
| Removal of VP shunt              | 13        | 1          |
| Repair of CSF Leak               | 6         | 0.5        |
| Repair of skull fracture         | 1         | 0.1        |
| Resection of tumor/lesion        | 203       | 15.6       |
| Revision of shunt                | 20        | 1          |
| Right frontal craniotomy         | 1         | 0.5        |
| Shunt Release                    | 2         | 0.2        |
| Spinal Fixation                  | 17        | 1.3        |
| Spinal Fusion                    | 1         | 0.1        |
| Sternocleidomastoid release      | 5         | 0.4        |
| Tethered cord release            | 8         | 0.6        |
| Transpedicular fixation          | 1         | 0.1        |
| TPF adjustment                   | 13        | 1          |
| Ulnar nerve release              | 9         | 0.7        |
| Ventriculoperitoneal shunt (VP)  | 243       | 18.6       |
| Missing                          | 4         | 0.3        |
| Total                            | 1305      | 100        |

**Table 3:** Demographics of various variables

| Variable                    | Frequency        | Percentage       |
|-----------------------------|------------------|------------------|
| Name                        | Available = 1244 | Available = 95   |
|                             | Missing = 61     | Missing = 5      |
| Age                         | Available = 1011 | Available = 77.5 |
|                             | Missing = 294    | Missing = 22.5   |
| Hospital registration No.   | Available = 1079 | Available = 82.7 |
|                             | Missing = 226    | Missing = 17.3   |
| Gender                      | Available = 1252 | Available = 96   |
|                             | Missing = 53     | Missing = 4      |
| Date of admission/discharge | Available = 1298 | Available = 99.5 |
|                             | Missing = 7      | Missing = 0.5    |
| Disease                     | Available = 1302 | Available = 99.8 |
|                             | Missing = 3      | Missing = 0.2    |
| Treatment                   | Available = 1301 | Available = 99.6 |
|                             | Missing = 4      | Missing = 0.4    |



**Bar chart 1:** Demographics of various variables

**Table 4:** Demographics of various diseases

| Disease                            | Frequency | Percentage |
|------------------------------------|-----------|------------|
| Arachnoid malformation             | 11        | 0.8        |
| Benign intracranial hypertension   | 10        | 0.8        |
| Blocked lumboperitoneal shunt      | 28        | 2.1        |
| Blocked ventriculoperitoneal shunt | 16        | 1.2        |
| Bony defect                        | 1         | 0.1        |
| Brain abscess                      | 22        | 1.7        |
| Brain metastasis                   | 2         | 0.2        |
| C2-C3 Neurofibroma                 | 1         | 0.1        |
| C2-C3 Spinal tumor                 | 1         | 0.1        |
| C5-C6 PIVD                         | 1         | 0.1        |
| Carpal tunnel syndrome             | 7         | 0.5        |
| Cauda equina syndrome              | 12        | 0.9        |
| Cerebellopontine angle tumor       | 5         | 0.4        |
| Cervical astrocytoma               | 1         | 0.1        |
| Cervical radiculopathy             | 1         | 0.1        |
| Cervical spondylosis               | 1         | 0.1        |
| Cervical stenosis                  | 9         | 0.7        |
| Cervical syrinx                    | 1         | 0.1        |
| Cervical tumor                     | 7         | 0.5        |
| Chronic subdural hematoma          | 35        | 2.7        |
| Common peroneal nerve injury       | 3         | 0.2        |
| Conus medularis lesion             | 6         | 0.5        |
| Coronal suture                     | 1         | 0.1        |
| Cranial defect                     | 1         | 0.1        |
| Craniopharyngioma                  | 4         | 0.3        |
| Craniosynostosis                   | 2         | 0.2        |
| CSF leak                           | 6         | 0.5        |
| Cubital tunnel syndrome            | 9         | 0.7        |
| D11-D12 spinal instability         | 4         | 0.3        |
| D7-D8 spinal tumor                 | 12        | 0.9        |
| D8-D9 stenosis                     | 1         | 0.1        |
| Dandy walker syndrome              | 1         | 0.1        |
| Depressed skull fracture           | 7         | 0.5        |
| Dermoid cyst                       | 14        | 1.1        |
| Discitis                           | 7         | 0.5        |
| Displaced rod                      | 1         | 0.1        |
| Encephalocele                      | 22        | 1.7        |
| Ependymoma                         | 3         | 0.2        |
| Epidural hematoma                  | 1         | 0.1        |
| Exposed Shunt                      | 2         | 0.2        |
| Extra dural hematoma               | 11        | 0.8        |
| Frontal astrocytoma                | 1         | 0.1        |
| Frontal osteoma                    | 2         | 0.2        |
| Frontal sinus mucocele             | 3         | 0.2        |
| Glioblastoma multiforme            | 38        | 2.9        |
| Hydrocephalus                      | 201       | 15.4       |

|                                 |             |            |
|---------------------------------|-------------|------------|
| Infected spine flap             | 8           | 0.6        |
| Infected TPF                    | 1           | 0.1        |
| L1 metastasis                   | 1           | 0.1        |
| L3-L4 stenosis                  | 2           | 0.2        |
| L4-L5 stenosis                  | 102         | 7.8        |
| L5-S1 listhesis                 | 1           | 0.1        |
| L5-S1 rupture                   | 1           | 0.1        |
| L5-S1 stenosis                  | 5           | 0.4        |
| Lipomeningocele                 | 6           | 0.5        |
| Lumber spine extrusion          | 1           | 0.1        |
| Median nerve injury             | 4           | 0.2        |
| Medulloblastoma                 | 1           | 0.1        |
| Meningioma                      | 37          | 2.8        |
| Misplaced screw                 | 2           | 0.2        |
| Myelomeningocele                | 85          | 6.5        |
| Neurofibroma                    | 10          | 0.8        |
| Occipital fracture              | 1           | 0.1        |
| Occipital hematoma              | 1           | 0.1        |
| Occipital encephalocele         | 1           | 0.1        |
| Orbital tumor                   | 2           | 0.2        |
| Osteoma                         | 2           | 0.2        |
| Peripheral neuropathy           | 2           | 0.2        |
| Pilocytic Astrocytoma           | 2           | 0.1        |
| Pineal tumor                    | 2           | 0.2        |
| Pituitary adenoma               | 9           | 0.7        |
| PIVD C2-C3                      | 1           | 0.1        |
| PIVD C3-C4                      | 1           | 0.1        |
| PIVD C4-C5                      | 8           | 0.6        |
| PIVD C5-C6                      | 13          | 1          |
| PIVD C6-C7                      | 7           | 0.5        |
| PIVD L2-L3                      | 4           | 0.3        |
| PIVD L3-L4                      | 20          | 1.5        |
| PIVD L4-L5                      | 153         | 11.7       |
| PIVD L5-S1                      | 150         | 11.5       |
| Post craniotomy displaced bone  | 1           | 0.1        |
| Post laminectomy infected wound | 1           | 0.1        |
| Posterior fossa tumor           | 21          | 1.6        |
| Radial nerve neuropathy         | 2           | 0.2        |
| Right frontal swelling          | 1           | 0.1        |
| Right parietal lesion           | 1           | 0.1        |
| Right ulnar neuropathy          | 2           | 0.1        |
| Ruptured disc L5-S1             | 10          | 0.8        |
| Sacral chordoma                 | 9           | 0.7        |
| Scalp swelling                  | 1           | 0.1        |
| scoliosis                       | 1           | 0.1        |
| Shunt leak                      | 1           | 0.1        |
| Sinus discharge                 | 1           | 0.1        |
| Spinal abscess                  | 1           | 0.1        |
| Spinal instability              | 6           | 0.5        |
| Spinal metastasis               | 3           | 0.2        |
| Spinal stenosis                 | 3           | 0.2        |
| Spinal tumor                    | 2           | 0.2        |
| Split cord malformation         | 2           | 0.2        |
| spondylolisthesis               | 7           | 0.5        |
| Subdural hygroma                | 1           | 0.1        |
| Suprasellar lesion              | 4           | 0.3        |
| syringomyelia                   | 2           | 0.2        |
| Tethered cord syndrome          | 8           | 0.6        |
| Torticollis                     | 5           | 0.4        |
| Tuberculous meningitis          | 15          | 1.1        |
| Tuberculous spine               | 8           | 0.6        |
| Ulnar nerve injury              | 2           | 0.2        |
| <b>Total</b>                    | <b>1305</b> | <b>100</b> |

## Discussion

Surgical audit forms an indispensable part of the practice of surgery today. Audits provide a measure of current performance, reduce clinical risk to the patients and personnel and ultimately aim to improve patient care. The

audit process also evaluates the institutional practices and by extension national standards of health care delivery [9]. Surgical units that have regular auditing processes have a clearer idea of the situational analysis of the workings of the unit. This ultimately translates into better management, better planning and review of mistakes. Also, with proper functioning units, staff morale is elevated. A good unit should have regular reports and learn from clinical incidences and near misses. Key performance indicators like major complications, readmissions, reoperations, transfers, incident reports, complaints and mortalities must also be included [10].

The clinical audit conducted in our neurosurgery department enrolled 1305 patients and the main goal of this project was to evaluate the documentation and data entry related to selected patient variables. Similar audits have been conducted on national and international level using various sample sizes: An audit of 822 patients was done by Waqar SH *et al* [11], 5079 patients by Akhtar H *et al* [12] and 171 patients by Gagné J-F *et al* [13]. The Mean age of presentation was 23.3 +\_ 11.3 SD in our study compared to 35.9 in another local study by Jawaid M *et al* [14]. We had predominantly, more males in this study, (52.8%), compared to females (43.1%) and this finding was in accordance with the study of Waqar SH *et al* [11] which had 54.9% males and Bindroo S *et al* [15] having (65.6%) males. Contact numbers, such an important tool for patient follow-up, were not recorded for any of the patients in our audit however this trend is not very popular in other centers as well: Contact numbers were only documented in only 14.3% of the files from the 1st cycle as illustrated by Awad MSA *et al* [16] in their paper. Date of admission/discharge was documented in 99% patient files compared to 41% Majeed S *et al* [17] in their paper. The following audit revealed documentation of 95% names which is satisfactory as compared to the study of Singh MM *et al* [18] where only 30% names were recorded in the gynecology department.

As far as diseases are concerned, files were found complete for 99% of patients with the foremost being hydrocephalus (15%) and prolapsed intervertebral disc at various levels (11%). The list of procedures done was also very vast, 99% data available, with the two most common being resection of various tumors and lesions (15%) and laminectomies (32%). In a study by Mushwani M *et al* [19] and colleagues concerning ENT patients at Mayo hospital Lahore, tonsillectomy was the most common surgery which was 187(23.25%) while septoplasty was the second most performed surgery done under GA 126(15.6%). Bhatti *et al* [20] also reported appendiceal diseases as a most common emergency in their audit. The most common procedure performed in elective surgeries was combined laparoscopic and open cholecystectomy (26.8%) and incision and drainage in the emergency (39.4%) [12]. We must acknowledge the work of the nursing staff and our trainee medical officers and house officers that they were almost always able to respond not only to the demands made by our increasingly specialized surgery, but also to the apparently endless stream of patients requiring their care.

Certain limitations that were noticed during the work-up of this audit need to be highlighted for future reference. All the data pertaining to patient demographics from address and contact number to occupation should be deemed important and valuable in-patient management therefore these variables should have also been assessed. The audit should



have involved all the staff related to the department since most of the senior consultants couldn't participate due to their busy schedules. A dire need is sensed to incorporate the clinical audit in our health care system to assess our proper demographics, disease spectrum, the pattern of admissions, details of procedures, length of hospital stay, complete data of morbidity and mortality and outcomes.

### Conclusion

Patient management is a very critical issue. It is literally a matter of life and death. Hence the pertinent questions to be raised are the following: Is the quality of care what it should be and are they doing as well as the other comparable centers? These questions may only be answered if an effective system of audit is in place. All possible steps should be taken to ensure that all hospital medical records are maintained in a systemic and orderly manner. The importance of medical records should also be communicated to all staff. Periodic audits of the medical records will help to determine the possible deficiency in keeping records, which can be improved and worked upon by the hospital.

### Acknowledgment

None.

### Ethical approval

The research/study complied with permission from the hospital ethical committee.

### Declaration of Patient's Interest

Patient's consent was not required as patients were not physically enrolled in this study.

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None. The whole project was self-funded by the authors.

### Conflicts of Interest

There are no conflicts of interest.

### Use of Artificial Intelligence (ai)-Assisted Technology for Manuscript Preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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