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# ASSESSMENT OF NURSES' KNOWLEDGE AND SELF-REPORTED PRACTICE REGARDING HYDROCEPHALUS CARE AT GULAB DEVI HOSPITAL, LAHORE

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## Abstract

***Background:*** *Hydrocephalus is a critical neurological condition marked by abnormal cerebrospinal fluid (CSF) dynamics and ventricular enlargement. Safe clinical management relies heavily on bedside nursing vigilance, including accurate neurological monitoring, sterile external ventricular drain (EVD) maintenance, and rapid recognition of ventriculoperitoneal (VP) shunt failure.*

***Objective:*** *This study aimed to evaluate the baseline level of knowledge and self-reported clinical practice regarding hydrocephalus care among registered nurses at Gulab Devi Hospital, Lahore, and analyze the associations between nurses' professional characteristics and their competence scores.*

***Methodology:*** *A descriptive cross-sectional quantitative research design was conducted among 103 registered nurses working in pediatric, neurosurgical, intensive care, and emergency departments at Gulab Devi Hospital, Lahore. Participants were recruited through convenience sampling based on a calculated finite population (N=140, n=103 via Slovin's formula). Data were gathered via a structured questionnaire encompassing demographic profiles, 20 factual knowledge items, and 18 self-reported clinical practice items. Data were analyzed using SPSS version 26, employing descriptive statistics, chi-square tests, one-way ANOVA, independent-samples t-tests, and Pearson correlation coefficients at $p < 0.05$.*

***Results:*** *Out of 103 nurses, 78.6% were female, 31.1% were aged 26–30 years, 44.7% held a Nursing Diploma, and 32.0% had 1–3 years of clinical experience. The overall mean knowledge score was 10.57 ± 4.84 out of 20 (52.9%), reflecting predominantly Moderate knowledge (45.6%, n=47), followed by Good (31.1%, n=32) and Poor knowledge (23.3%, n=24). Distinct knowledge deficits were identified regarding Cushing's triad (28.2%), EVD transducer reference leveling (28.2%), and normal adult ICP ranges (31.1%). In contrast, overall self-reported practice was considerably higher, with a mean score of 39.09 ± 11.13 out of 54 (72.4%), categorized as Good (60.2%, n=62) and Moderate practice (37.9%, n=39). Pearson correlation demonstrated a positive relationship between total knowledge and practice scores ($r = 0.359$, $P = 0.0002$). Formal neuro-nursing training was the most significant predictor of superior performance, with*

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*trained nurses achieving significantly higher knowledge (59.05% vs. 43.12%, p < 0.001) and practice scores (79.12% vs. 61.76%, p < 0.001).*

***Conclusion:*** *While nurses at Gulab Devi Hospital exhibit good adherence to routine care practices, substantial gaps remain in advanced physiological and device-specific knowledge. Institutional implementation of standardized EVD care bundles, practical simulation training, and structured continuous nursing education is strongly recommended.*

## 1. INTRODUCTION

Hydrocephalus is a critical and structurally complex neurological disorder characterized by an abnormal accumulation of cerebrospinal fluid (CSF) within the cerebral ventricles, resulting in ventricular enlargement, compromised cerebral perfusion, and elevated intracranial pressure (ICP) (Thomale, 2021). Under normal physiological equilibrium, CSF is continuously secreted by the choroid plexus, circulates through the cerebral ventricles, and undergoes absorption into the venous sinuses. Pathophysiologically, hydrocephalus develops when this balance is disrupted by mechanical obstruction, impaired venous absorption, or altered intracranial compliance (Kahle et al., 2024).

Hydrocephalus can manifest across all age cohorts, spanning neonates, infants, young children, adults, and the elderly. Its clinical etiology and presentation differ fundamentally by demographic group. Congenital hydrocephalus frequently arises from neural tube defects, Dandy-Walker malformations, or congenital aqueductal stenosis. Acquired hydrocephalus frequently develops secondary to intraventricular hemorrhage in premature infants, bacterial or tuberculous meningitis, severe traumatic brain injury, or intracranial neoplasms (Ferris et al., 2024; Thomale, 2021).

Neurosurgical intervention is the cornerstone of hydrocephalus management. The standard long-term intervention is the surgical placement of a ventriculoperitoneal (VP) shunt, which diverts excess CSF into the peritoneal cavity (Dostovic et al., 2025). In acute neurotrauma, intraventricular hemorrhage, and post-operative neurosurgical emergencies, an External Ventricular Drain (EVD) is frequently placed for temporary therapeutic CSF drainage and direct ICP monitoring (Hepburn-Smith et al., 2016). EVD management demands exceptional bedside nursing competence. The drainage transducer must be precisely leveled at the anatomical reference point the external auditory meatus or tragus—to maintain prescribed intracranial hydrostatic gradients (Fried et al., 2016; Vieira et al., 2022).

Bedside nurses occupy the vital frontline position in hydrocephalus management across pediatric wards, neurosurgical units, intensive care environments, and emergency departments. When nursing staff possess solid theoretical knowledge and adhere strictly to standardized evidence-based protocols, preventable catheter infections and unrecognized shunt failures are dramatically minimized (Aslam et al., 2022). Therefore, this study aims to systematically assess the baseline knowledge and reported clinical practices of nurses at Gulab Devi Hospital, Lahore, to identify educational weaknesses and optimize hospital clinical workflows.

## 2. Methodology

### 2.1 Study Design and Setting

A quantitative descriptive cross-sectional study design was utilized. The investigation was conducted across relevant inpatient units (pediatric medical/surgical wards, neurosurgical wards, ICUs/PICUs/NICUs, and emergency departments) at Gulab Devi Hospital, Lahore, Punjab, Pakistan.

### 2.2 Population and Sampling

The target population comprised all registered nurses (RNs) actively employed in bedside patient care in the specified units. Using Slovin's mathematical formula for finite populations (N=140) at a 95% confidence level and 5% margin of error, a sample size of 104 was calculated. Exactly 103 fully completed, valid questionnaires

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were retrieved and analyzed (N=103). Non-probability convenience sampling was used.

### 2.3 Data Collection Instrument

Data were gathered using a structured self-administered questionnaire comprising three sections: Section A (Demographic & Professional Profile), Section B (20-item Knowledge Assessment Scale scored 0–20), and Section C (18-item Clinical Practice Assessment Scale scored 18–54 on a 3-point Likert scale). The tool demonstrated high reliability with Cronbach's alpha values of 0.81 for knowledge and 0.84 for practice.

### 2.4 Data Analysis

Data were analyzed using SPSS Version 26.0. Descriptive statistics (frequencies, percentages, means, standard deviations) and inferential statistics (Chi-square tests, One-Way ANOVA, Independent-samples t-tests, Pearson correlation) were computed at a significance threshold of $p < 0.05$.

## 3. Results

A total of 103 validated questionnaires were analyzed. The sample comprised 78.6% female nurses (n=81) and 21.4% male nurses (n=22). The largest age group was 26–30 years (31.1%). Regarding education, 44.7% held a General Nursing Diploma, 27.2% BSN, 18.4% Post-RN BSN, and 9.7% MSN. Overall, 61.2% had attended formal neuro-nursing training, and 67.0% had prior experience caring for VP shunt/EVD patients.

**Table 1: Collective Demographic Data of the Participants (N = 103)**

| Sr. No. | Demographic Variables | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|---|
| 01 | Gender of the Participants | Male | 22 | 21.4% |
| | | Female | 81 | 78.6% |
| 02 | Age Group (Years) | 21–25 years | 25 | 24.3% |
| | | 26–30 years | 32 | 31.1% |
| | | 31–35 years | 22 | 21.4% |
| | | > 35 years | 24 | 23.3% |
| 03 | Educational Qualification | Nursing Diploma | 46 | 44.7% |
| | | Generic BSN | 28 | 27.2% |
| | | Post-RN BSN | 19 | 18.4% |
| | | MSN | 10 | 9.7% |
| 04 | Clinical Experience | 6 months – 1 year | 16 | 15.5% |
| | | 1 – 3 years | 33 | 32.0% |
| | | 3 – 5 years | 30 | 29.1% |
| | | > 5 years | 24 | 23.3% |
| 05 | Working Department | Pediatric Ward | 29 | 28.2% |
| | | Neurosurgical Ward | 32 | 31.1% |
| | | ICU / PICU / NICU | 21 | 20.4% |
| | | Emergency Department | 21 | 20.4% |

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| | | | | |
|---|---|---|---|---|
| 06 | Formal Neuro-Nursing Training | Yes (Trained) | 63 | 61.2% |
| | | No (Untrained) | 40 | 38.8% |
| 07 | Prior Shunt / EVD Exposure | Yes | 69 | 67.0% |
| | | No | 34 | 33.0% |

**Table 2: Knowledge Level & Practice Score Classifications**

| Performance Category | Knowledge Level, n (%) | Practice Level, n (%) |
|---|---|---|
| Good (> 66.6%) | 32 (31.1%) | 62 (60.2%) |
| Moderate (33.3% - 66.6%) | 47 (45.6%) | 39 (37.9%) |
| Poor (< 33.3%) | 24 (23.3%) | 2 (1.9%) |
| Total Cohort | 103 (100.0%) | 103 (100.0%) |

The mean total knowledge score was 10.57 ± 4.84 out of 20 (52.9%). Major knowledge deficits were observed in identifying Cushing's triad (28.2% correct), EVD transducer leveling at the tragus (28.2% correct), and adult normal ICP range (31.1% correct). Conversely, self-reported practice averaged 39.09 ± 11.13 out of 54 (72.4%). High adherence was reported for hand hygiene (63.1% Always) and EVD leveling re-checks (58.3% Always), but lower adherence was noted for maintaining strict closed drainage circuits (22.3% Always) and caregiver education (26.2% Always).

**Table 3: Inferential Analysis of Professional Factors on Knowledge & Practice**

| Factor Variable | Knowledge Score p-value | Practice Score p-value | Statistical Inference |
|---|---|---|---|
| Educational Qualification | $p < 0.001$ (ANOVA) | $p = 0.0119$ (ANOVA) | Significant overall impact |
| Clinical Experience | $p = 0.0182$ (ANOVA) | $p = 0.0785$ (ANOVA) | Significant on Knowledge |
| Working Department | $p = 0.5246$ (ANOVA) | $p < 0.001$ (ANOVA) | Significant on Practice |
| Formal CNE Training | $p < 0.001$ (t-test) | $p < 0.001$ (t-test) | Highly Significant on Both |
| Prior Shunt/EVD Care | $p = 0.0224$ (t-test) | $p = 0.1534$ (t-test) | Significant on Knowledge |

## 4. Discussion

This investigation establishes that bedside nurses at Gulab Devi Hospital possess a moderate level of theoretical knowledge (52.9%) alongside good self-reported clinical practice (72.4%). The significant positive correlation between knowledge and practice ($r = 0.359$, $p = 0.0002$) underscores that solid theoretical understanding directly reinforces safe bedside performance.

The alarming technical knowledge gaps regarding Cushing's triad (28.2%), EVD zero-referencing at the tragus (28.2%), and normal adult ICP limits (31.1%) reflect similar international findings (Vieira et al., 2022; Fried et al., 2016). Cushing's triad represents impending brainstem herniation; failure to recognize widened pulse pressure and bradycardia delays life-saving neurosurgical escalation. Furthermore, misaligning EVD transducers risks dangerous over-drainage or intracranial hypertension.

Importantly, formal continuing nursing education (CNE) emerged as the single most powerful predictor of nursing excellence. Trained nurses significantly outperformed untrained peers in both knowledge (59.05% vs. 43.12%, $p < 0.001$) and practice (79.12% vs. 61.76%, $p < 0.001$). This

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provides compelling empirical evidence supporting mandatory continuous training in neurosurgical wards.

**5. Conclusion & Actionable Recommendations**

Although clinical practice adherence is relatively strong, critical theoretical knowledge deficits persist among bedside nurses at Gulab Devi Hospital. To bridge the knowledge-practice gap and ensure patient safety, the following actions are recommended:

**1. Mandatory Neuro-Nursing Certification:** Establish a mandatory 3-day neuro-nursing orientation and skills workshop for all nurses posted in pediatric, neurosurgical, ICU, and emergency units.

**2. Standardized Bedside Protocol Posters:** Mount visual posters depicting EVD leveling anatomical reference points (tragus) and age-specific ICP ranges at every neuro-drainage bedside.

**3. Closed Drainage Line Audits:** Enforce strict non-touch care bundles to restrict non-essential EVD line sampling and prevent ventriculitis.

**4. Caregiver Discharge Education:** Develop bilingual pictorial discharge guides educating parents on early signs of shunt malfunction and infection.

**REFERENCES**

Ahmed, N., Hassan, A., Rehman, Z., & Shamim, M. S. (2025). Changing landscape of hydrocephalus treatment in Pakistan: A brief history and bibliometric analysis. Asian Journal of Neurosurgery, 20(4), 732-738.

Alemán-Iñiguez, J. M., et al. (2024). Cerebrospinal fluid shunt reinfection and malfunction in Ecuadorian children with different reshunting criteria. World Neurosurgery, 186, e161-e172.

Alomar, S. A., et al. (2023). The impact of nursing education on emergency bedside external ventricular drain insertion for patients with acute hydrocephalus. Cureus, 15(1), e34276.

Aslam, H., Afzal, M., Sarwar, H., & Khan, S. (2022). Effect of external ventricular drain care guidelines on nursing practice and complications among patients with post-traumatic hydrocephalus. Pakistan Journal of Medical & Health Sciences, 16(2), 1128-1131.

Bae, K. S., & Roh, Y. S. (2022). Effects of a multifaceted neurological assessment educational program in nursing students: A randomized crossover study. Nurse Education in Practice, 63, 103378.

Dostovic, A., et al. (2025). Complications and outcome in patients with hydrocephalus who have had a ventriculoperitoneal shunt implanted. Medical Archives, 79(2), 122-126.

Ferris, E., et al. (2024). The etiology of pediatric hydrocephalus across Asia: A systematic review and meta-analysis. Journal of Neurosurgery: Pediatrics, 33(4), 323-333.

Fried, H. I., et al. (2016). The insertion and management of external ventricular drains: An evidence-based consensus statement. Neurocritical Care, 24(1), 61-81.

Hepburn-Smith, M., et al. (2016). Establishment of an external ventricular drain best practice guideline. Journal of Neuroscience Nursing, 48(1), 54-65.

Kahle, K. T., et al. (2024). Paediatric hydrocephalus. Nature Reviews Disease Primers, 10, Article 35.

Ponnambath, D. K., et al. (2024). Development of an evidence-based care bundle for prevention of external ventricular drain-related infection. Indian Journal of Critical Care Medicine, 28(8), 760-768.

Thomale, U. W. (2021). Hydrocephalus: Reading between the lines. Child's Nervous System, 37(11), 3323-3336.

Frontier in Medical & Health Research

ISSN: (e) 3007-1607 (p) 3007-1593

Vieira, T. W., et al. (2022). External ventricular drains: Development and evaluation of a nursing clinical practice guideline. Nursing Reports, 12(4), 933-944.