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Knowledge of Traumatic Brain Injury (TBI) Protocols Among Medical Students and Hospital Staff: A Cross-Sectional Questionnaire-Based Study

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ABSTRACT

Background:
Traumatic Brain Injury (TBI) is a leading cause of mortality and disability worldwide. Effective management relies on strict adherence to standardized protocols such as **Advanced Trauma Life Support (ATLS)** and **Brain Trauma Foundation (BTF) guidelines**, which emphasize early stabilization and prevention of secondary brain injury.

Objective:
To assess the knowledge and awareness of TBI management protocols among medical students and hospital staff.

Methods:
A cross-sectional questionnaire-based study was conducted among 300 participants, including MBBS students/interns (100), BDS students (50), nursing students (50), and hospital staff (100). The study was carried out in 2 medical colleges, 2 dental colleges, 2 nursing colleges, and one private hospital in India.

Results:
MBBS students showed the highest knowledge levels, while hospital staff had moderate awareness. Significant gaps were observed in understanding ICP management, ventilation targets, and protocol-based emergency care.

Conclusion:
Although basic knowledge exists, there is a need for structured training programs to improve adherence to TBI protocols among healthcare trainees and staff.

Keywords: Traumatic Brain Injury, ATLS, Brain Trauma Foundation, Protocol Awareness, Medical Education

1. INTRODUCTION

Traumatic Brain Injury (TBI) is a major global health concern, particularly affecting young adults and contributing significantly to morbidity and mortality.

Management of TBI is highly protocol-driven and focuses on preventing **secondary brain injury**, which may result from hypoxia, hypotension, or increased intracranial pressure (ICP).

Standard protocols include:

- **ATLS principles (Airway, Breathing, Circulation)**
- Maintenance of oxygen saturation >90%
- Prevention of hypotension (SBP ≥90–110 mmHg)
- Use of Glasgow Coma Scale (GCS) for assessment
- ICP monitoring and control when required

Despite the availability of guidelines, inadequate awareness among healthcare workers can lead to poor outcomes. This study evaluates knowledge gaps among different healthcare groups.

2. SPECIFIC OBJECTIVES

Primary Objective

- To assess knowledge of TBI management protocols among medical students and hospital staff.

Secondary Objectives

- To compare knowledge levels across different groups
- To identify gaps in protocol awareness
- To assess training needs in TBI management

3. METHODOLOGY

Study Design

- Cross-sectional questionnaire-based study

Study Setting

- 2 Medical Colleges
- 2 Dental Colleges
- 2 Nursing Colleges
- 1 Private Hospital in India

Study Population

Group	**Number**
MBBS Students & Interns	100
BDS Students	50
Nursing Students	50
Hospital Staff (Nurses & Technicians)	100
Total	**300**

Inclusion Criteria

- Students and staff willing to participate
- Clinical exposure to patient care

Exclusion Criteria

- Non-consenting individuals
- Incomplete responses

Ethical considerations: Not deemed essential.

Questionnaire

A structured 15- item questionnaire assessed:

1. Awareness of ATLS protocol
2. Knowledge of GCS scoring
3. Airway management in TBI
4. Oxygenation targets
5. Blood pressure management
6. ICP monitoring
7. Indications for CT scan
8. Management of severe TBI (GCS ≤8)
9. Role of hyperventilation
10. Prevention of secondary brain injury

Instructions:

Please indicate your level of agreement with the following statements related to **Traumatic Brain Injury (TBI) management protocols**.

Response Options:
1 = Strongly Disagree
2 = Disagree
3 = Neutral
4 = Agree
5 = Strongly Agree

Section A: Awareness & Basic Knowledge

1. I am familiar with standard TBI management protocols (e.g., ATLS guidelines).
2. I understand the importance of the Glasgow Coma Scale (GCS) in TBI assessment.
3. I can correctly classify the severity of TBI based on GCS score.

Section B: Initial Management (Primary Survey)

4. Airway management is the first priority in TBI patients.
5. Maintaining adequate oxygenation (SpO_2 > 90%) is essential in TBI management.
6. Preventing hypotension is critical to avoid secondary brain injury.

Section C: Clinical Decision-Making

7. I am aware of the indications for CT scan in head injury patients.
8. I understand when intubation is required in TBI patients.
9. I am confident in identifying patients with severe TBI (GCS ≤ 8).

Section D: Advanced Management

10. I am aware of intracranial pressure (ICP) monitoring in TBI.
11. I understand the normal range of intracranial pressure.
12. I know when hyperventilation should be used in TBI patients.

Section E: Prevention of Secondary Brain Injury

13. Avoiding hypoxia is essential in TBI management.
14. Avoiding hypotension improves outcomes in TBI patients.
15. Early and protocol-based management reduces complications in TBI.

4. RESULTS

Table 1: Demographic Distribution

Group	Number	Percentage
MBBS Students/Interns	100	33.3%
BDS Students	50	16.7%
Nursing Students	50	16.7%
Hospital Staff	100	33.3%

Table 2: Mean Knowledge Scores

Group	Mean Score (%)
MBBS Students/Interns	80
Nursing Students	72
BDS Students	65
Hospital Staff	60

Table 3: Awareness of Key TBI Protocol Components

Parameter	Correct Response (%)
ATLS Protocol Awareness	78%
GCS Knowledge	85%

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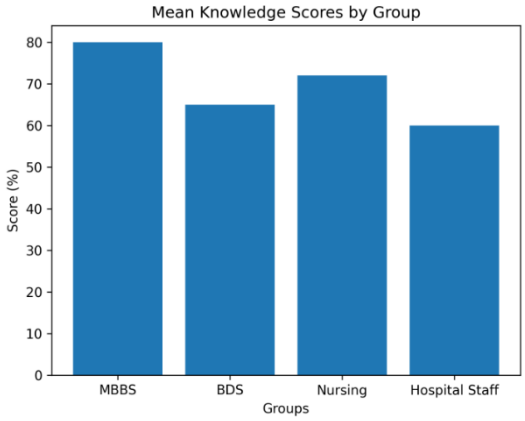
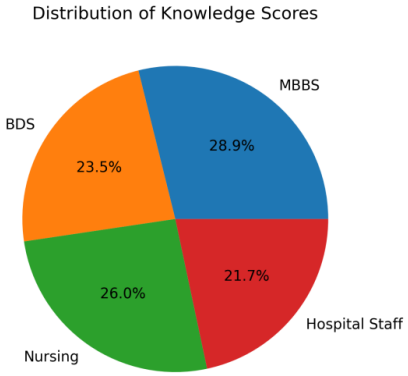
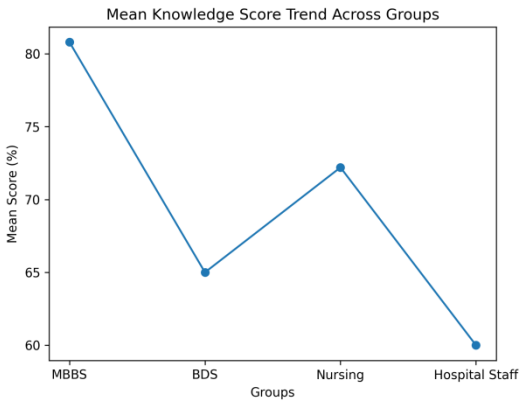
Parameter	**Correct Response (%)**
Airway Management	70%
Oxygenation Targets	65%
Blood Pressure Targets	60%
ICP Monitoring	55%
Hyperventilation Use	50%







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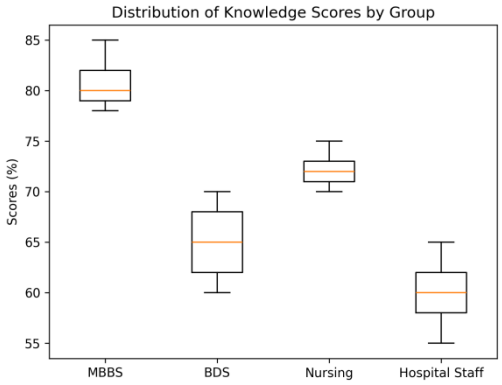

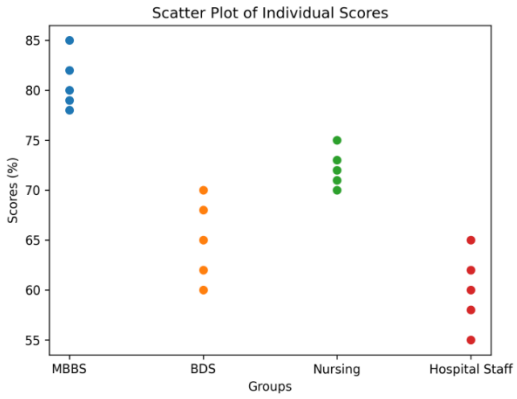

5. DISCUSSION

The study highlights significant variability in knowledge of TBI protocols.

- MBBS students demonstrated better understanding due to clinical exposure.
- Nursing students showed moderate awareness, reflecting partial training.
- Hospital staff had lower scores, indicating insufficient formal training.

According to established guidelines:

- Initial assessment follows **ATLS principles**, prioritizing airway and circulation
- Hypoxia and hypotension must be avoided as they worsen outcomes
- ICP management is crucial, with treatment recommended when ICP >22 mmHg

A notable gap was seen in:

- Understanding of **ventilation targets**
- Indications for **hyperventilation**
- Knowledge of **ICP monitoring**

These findings are consistent with previous literature indicating inadequate protocol adherence in clinical settings.

6. STRENGTHS

- Multi-institutional study

- Inclusion of diverse healthcare groups
- Practical, protocol-based assessment

7. LIMITATIONS

- Self-reported responses
- Limited geographic representation
- No assessment of practical skills

8. RECOMMENDATIONS

- Regular **ATLS-based training programs**
- Simulation-based TBI management workshops
- Inclusion of protocol-based teaching in curriculum
- Continuous medical education (CME) for hospital staff

9. CONCLUSION

Knowledge of TBI protocols among healthcare trainees and staff is **moderate but insufficient**, particularly in advanced management areas. Structured education and training are essential to improve patient outcomes.

10. CONFLICT OF INTEREST: None declared.

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