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A CROSS SECTIONAL STUDY OF EVALUATION OF REVISED TRAUMA SCORE (RTS) AND GLASGOW COMA SCALE, AGE AND ARTERIAL PRESSURE (GAP) SCORING IN PREDICTING MORTALITY OF TRAUMA PATIENTS WITH SPECIAL REFERENCE TO HEAD INJURY PATIENTS IN A TERTIARY CARE CENTRE OF NORTH EAST INDIA

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ABSTRACT

INTRODUCTION: Trauma is the largest cause of year of life lost (YLL) and the second most frequent cause of death among the youth in developing nations, ranking among the top four causes of death. The head injury severity can be objectively assessed with the aid of injury severity scoring systems. The purpose of this study is to evaluate two injury scoring systems the RTS (REVISED TRAUMA SCORE) and the GAP (GCS, AGE, ARTERIAL PRESSURE) scores to predict mortality in head injury patients.
METHODS: A Cross-sectional study was carried out over a period of one year from 1st March, 2023 to 29th February,2024. The study comprised of 150 patients with head injury. RTS and GAP scores were calculated and results were correlated with mortality. Outcome measures like sensitivity, specificity and accuracy were calculated.
RESULTS: RTS score had sensitivity of 95.24% specificity of 73.15% and accuracy of 79.33% in predicting mortality in our study. GAP score had a 92.86% sensitivity and an 79.63% specificity in predicting death with accuracy of 83.33%.
CONCLUSION: The high sensitivity of RTS makes it a valuable tool for identifying patients who are at risk of death, and the higher specificity of the GAP score allows for more accurate patient outcome prediction. GAP score is easily implimented and simpler compared to RTS score taking into account the actual circumstances of medical practice in middle class and lower income nations.

INTRODUCTION

Trauma is the largest cause of year of life lost (YLL) and the second most frequent cause of death among the youth in developing nations, ranking among the top four causes of death. Trauma is a condition which worsens with time, and in the hours immediately following a

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trauma, assessment, resuscitation, treatment and management are crucial and, when performed correctly, can significantly lower mortality .1,2
The definition of Traumatic Brain Injury (TBI) is "disruption or alteration of brain function due to external forces". The age-standardized incidence rates of TBI patients increased by 8.4% worldwide from 1990 until 2016. Approximately sixty nine million individuals endure from TBI every year, with the majority of cases occurring in South-East Asia. The rate of road traffic injuries (RTI) has increased globally due to factors such as urbanization, increasing population density, and an increase in the number of motor vehicles. Over time, TBI-related mortality has also increased. 3
A standardized way to describe coma was established in 1974 with the introduction of Glasgow Coma Scale (GCS). The scale has grown to be one of the most widely used TBI scores and is still a reliable indicator of patient outcome. Members of the healthcare team can immediately assess the severity, observe changes in the patient's state of awareness upon repeated evaluations, and forecast patient's outcome with the aid of the GCS, which is simple to use3,4.

Patients with brain injuries can benefit from regular, frequent evaluations that can be used to spot early improvements or declines in their condition. Johns Hopkins University researchers Baker and colleagues created first grading method according to anatomical injuries to body in 1974. The Injury Severity Scale (ISS) is not a triage criterion; rather, it is primarily used for research reasons to assess the extent of injury in a trauma patient. Prior to the development of the ISS system, surgeons had little way of knowing how well a traumatized patient would respond to treatment. Champion et al. developed Trauma Score (TS) triage measure in 1981. Inventor of the measure postulated that harm to one among the 3 systems—the central nervous system, respiratory system, cardiovascular system— was the most common reason why secondary trauma caused early death.2 The rate of respiration (RR), GCS, chest expansion during the respiration, capillary refill and systolic blood pressure (SBP) are the five variables that make up the TS criteria.

An altered version of Trauma score (TS) was introduced in 1989 and named the Revised Trauma Score (RTS). Three variables were part of the RTS criterion: RR, SBP, and GCS. The ‘Mechanism, Glasgow coma scale, age, arterial pressure and prognosis’ (MGAP) standard is a trauma patient rating system that gives doctors important information for making prognostic decisions. Kondo et al. changed MGAP to ‘Glasgow coma scale, age and arterial pressure’ (GAP) to make it easier to use in clinical settings.

The RTS and GAP score are two techniques that can be used to forecast whether a head injury patient's condition will improve or worsen. Since its introduction, the RTS (Revised Trauma Score) system has been utilized extensively worldwide, primarily as a physiological evaluation technique with great responsiveness in accurately predicting death. The respiration rate, systolic blood pressure and Glasgow Coma Scale (GCS) are combined by the system.

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The head injury severity can be objectively assessed with the aid of injury severity scoring systems. Therefore, purpose of this study is to evaluate two injury scoring systems the GAP and RTS.

AIM

To assess and analyze GAP and RTS scoring system in predicting mortality in head injury patients.

OBJECTIVE

To compare GAP and RTS scoring in predicting the mortality in head injury patients.

Null hypothesis – There is no difference between GAP and RTS scoring in predicting mortality in head injury patents.

REVIEW OF LITERATURE:

Ancient stories from before written history have references to head injuries. There's a chance that trepanation was once used for treatment of Traumatic Brain Injury (TBI) since holes are drilled over fracture lines in the skulls found in war burials. Ancient Mesopotamians were aware of the brain injury and a few of its side symptoms, like paralysis, convulsions, and speech impairment, hearing, vision. Edwin Smith Papyrus, which was composed between 1650 and 1550 BC, provides a systematic classification system for a range of brain traumas and symptoms based on how they manifest and are tractable

One of the pioneers in introducing the concept of concussion was Abu Bakr Muhammad Iben Zakariyah Al-Razi (845–925). He stated that head injuries are among the most devastating. He only advocated surgery for skull penetrations, which were usually fatal.

In cases of severe skull fractures, 16th-century surgeons first tried to remove bone fragments and clots. However, they also carried out surgeries to remove the accumulation of blood or purulent material and decompress the encephalon caused by septic or vascular disorders in addition to traumatic events.

The idea that intracranial pressure, as opposed to injury to the skull, was the root cause of post-trauma pathology was originally put forth in the 18th century. By the end of the 1800s, this theory was proven to be true, and the idea of treating the condition by popping the skull was put forth.

The invention of imaging techniques like MRI and CT in the 20th century, as well as diffusion tensor imaging (DTI) in the 21st, led to improvement of technologies that enhanced diagnosis and therapy. It has been said that "modern era" of head injuries began with development of

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intracranial pressure monitoring in 1950s14. Rehabilitation wasn't popular and TBI deaths were high until the 20th century.

Johns Hopkins University researchers Baker and colleagues created the first grading system according to bodily anatomical injuries to the in 1974. In order to offer a straightforward and dependable way to document and track changes in head injury patients' degree of consciousness, the Glasgow Coma Scale (GCS) was initially developed in the 1970s16.The score can be displayed as the response in each of three components (e.g., eyes, motor reaction, and verbal response = 465), or as a single figure (e.g., GCS = 15). “Glasgow coma scale” of less than eight is considered coma

Champion et al. developed Trauma Score (TS) triage measure in 1981. The inventor of the measure postulated that harm to one among the three systems—the cardiovascular system, the respiratory system, or central nervous system—was the most frequent cause of premature mortality from secondary trauma. The respiration rate (RR), respiratory expansion, GCS, capillary refill and systolic blood pressure (SBP) are the five variables that make up the TS criteria1.
An updated iteration of the Trauma Score (TS) criterion, known as Revised Trauma Score (RTS), was introduced in 1989. GCS, SBP, and RR were the three variables that made up the RTS criterion1.

In their research, Sartorius et al. concluded that the “Mechanism, GCS, Age, and Systolic blood pressure” (MGAP) score can accurately predict the hospitalized trauma patients' death risk. In addition, Yutaka Kondo et al. found that the hospital death rate for trauma patients may be reliably predicted.

Farzad Rahmani,1,* Hanieh Ebrahimi Bakhtavar,1 Samad Shams Vahdati,1 Mehran Hosseini,2 and Robab Mehdizadeh Esfanjani3 carried out a study **on “Evaluation of MGAP and GAP Trauma Scores to Predict Prognosis of Multiple-trauma Patients”** In order to forecast mortality rates, a study was conducted in 2016 with the objective of assessing the “GAP” and “MGAP” scores of patients with multiple trauma. The cut-off values of these scores were to be determined. This cross-sectional descriptive study comprised of a total of 374 people who had various traumas. We gathered information on age, injury mechanism, systolic blood pressure and GCS. “MGAP” and “GAP” scores were computed, and their correlation with the requirement for operative intervention, death in the emergency department, and hospital ward death was examined. The outcomes: The mean±standard deviation of patients' “MGAP and GAP scores were 24.36±5.04 and 20.53±5.08”, respectively. The MGAP and GAP areas under the Roc curves were 0.74, 0.80, and 0.99 for GAP and 0.75, 0.93, and 0.99 for non surgical treatment, survival in emergency department, and survival in hospital ward, respectively. They came to the conclusion that patients with many traumas might be accurately predicted by using their MGAP and GAP scores. In order to refer patients to the proper trauma hospitals in pre-hospital settings, emergency medical personnel should utilize these straightforward triage techniques.

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"GCS, age, and systolic blood pressure" (GAP) score17. Three risk groups were identified from the overall scores based on earlier research:
1. Group at low risk (MGAP score of 23–29 and GAP score of 19–25); 2.8% mortality rate.
2. Moderate-risk category; 15% death rate; MGAP and GAP scores range from 18 to 22.
3. High-risk group; 48% mortality rate (score < 18 for MGAP and < 11 for GAP).

Emergency physicians treated 2,136 trauma-related cases in the field from 1st of January 1987 to 31st December, 1987. This study comprised every trauma patient with Trauma Score of less than 16 and a ten percent of patients at random who had a Trauma Score of sixteen (n = 625). For 612 patients, the follow-up was successfully finished 97% of the time. Their individual score result and hospital outcome were correlated.

Subhannur Rahman et al. conducted a cross sectional study on "**Effectivity RTS and GAP to predict mortality patients of head injury at Emergency ward of Ulin Hospital Banjarmasin" in 2017.** The goal of the research was to estimate the predictive capacity of GAP (GCS, Age, Blood Systolic Pressure) and RTS (Revised Trauma Score) in terms of mortality for patients with head injuries at Ulin Hospital Banjarmasin's Emergency Ward. The study used cross-sectional methodologies. The information was extracted from a medical file between January 1 and March 31, 2016. Information gathered in accordance with the trauma scoring results. Results (dead or alive) noted in the first twenty-four hours following the patient's admission to the hospital. The data was examined with Chi square test. The Ulin Hospital Banjarmasin emergency room saw 109 patients with brain injuries who were between the ages of 36 and 5; 11 of these patients (10%) passed away. "Probabilities = 70.5% (95% CI = 1.893 - 3.019) for prediction mortality with score RTS p = 0.000 and OR = 2.390". In contrast, a prediction with the following scores: "GAP p = 0.000, OR = 41.550, likelihood = 97.6% (95% CI = 5.589 - 308.876)". They came to the conclusion that scoring GAP was a better predictor of death than RTS for patients who suffered head injuries in the emergency room within a day, with probabilities of roughly 97.6% as opposed to roughly 70.5% for RTS.

INDICATIONS OF SURGERY IN EXTRADURAL HEMORRHAGE (EDH)
1. Regardless of GCS, EDH volume of > 30 cm3 needs to be evacuated.
2. In a neurosurgical center, close neurological surveillance and repeated CT scans can be used to manage EDH without surgery if it possesses all of the following features: "Volume of < 30 cm3, thickness < 15 mm, midline shift (MLS) < 5 mm, GCS > 8, and no focal neurologic deficit" are the conditions that must be met.

INDICATIONS OF SURGERY IN ACUTE SUBDURAL HEMORRHAGE (ASDH)

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1. Any ASDH that has “thickness of more than 10 mm or a midline shift (MLS)” on CT that is more than 5 mm should be operated, irrespective of GCS.
2. If following conditions are met: a) the GCS lowers by more than two points from the time of injury to admission; b) pupils are fixed, dilated and asymmetric; c) the ICP is more than 20 mm Hg; or 5. ASDH with “thickness less than 10 mm and MLS less than 5mm” 3. keep track of ICP in all patients with GCS < 9 and ASDH.

INDICATIONS OF SURGERY IN TRAUMATIC INTRA CRANIAL HEMORRHAGE “TICH”

1. A steadily declining neurological state that can be referred to the TICH, medically refractory IC-HTN, or CT symptoms of mass effect.
2. More than 50 cm^3, cc, or ml of TICH volume.
3. GCS = 6–8 with compressed basal cisterns on CT, frontal or temporal TICH volume > 20 cm3, and midline shift (MLS) ≥ 5 mm.

TICH can be treated conservatively with close monitoring and serial imaging, as long as there is no neurologic compromise, no appreciable mass effect on CT scans, regulated intracranial pressure.

MATERIALS AND METHODS:

PLACE OF STUDY :	Department of General Surgery, Assam Medical College And Hospital
DURATION OF STUDY :	One Year
TYPE OF STUDY :	A Hospital based Cross-sectional study.
STUDY POPULATION :	All the cases of head injury presenting to emergency department, AMCH within 48 hours of injury.
SAMPLE SIZE :	Considering the probability of RTS scoring in predicting the mortality in patients of trauma to be 70.5% 1 : Sample size for the present study is calculated to be 150 with 95 % confidence and margin of error 10%.
INCLUSION CRITERIA :	Our study included all the head injury patients aged 20 years or older presenting to emergency department within 48 hours of injury who were treated at AMCH

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EXCLUSION CRITERIA :

Who were found to be dead on arrival
Who were declared dead in emergency department after failed resuscitation
Head injury patients presenting to emergency department after 48hours of injury
Patients not giving consent for inclusion in the study.

EYE-OPENING RESPONSE		VERBAL RESPONSE		MOTOR RESPONSE	
SCORE	RESPONSE	SCORE	RESPONSE	SCORE	RESPONSE
4	Spontaneous	5	Oriented	6	Obeys commands
3	To speech	4	Confused	5	Localizes to painful stimulus
2	To pain	3	Inappropriate responses	4	Withdraws to painful stimulus
1	No response	2	Incomprehensible responses	3	Flexion to painful stimulus
		1	No response	2	Extension to painful stimulus
				1	No response

The following formula was used to determine the RTS score:

TABLE REVISED TRAUMA SCORE (RTS)

Glasgow Coma Score	Systolic Blood Pressure	Respiratory Rate	Coded Value
13-15	>90	10-29	4
9-12	76-89	>30	3
6-8	50-75	6-9	2
4-5	1-49	1-5	1
3	0	0	0

RTS Score = 0.9368 (GCSc) + 0.7326(SBPc) + 0.2908 (RRc)
GAP score was calculated as follows:

TABLE GAP SCORE

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GCS	
3-15	3-15 points
Age	
<60	3 points
>60	0 point
Systolic blood pressure (mmHg)	
>120	6 points
60-120	4 points
<60	0 point

GAP: Glasgow coma scale, age, and arterial pressure; GCS: Glasgow coma scale.

Patients were treated with conservative or operative management after radiological investigations.

Mortality within 30 days of admission, Time of death after admission, cause of death was noted.

STATISTICAL ANALYSIS:

The data collected were tabulated in Microsoft Excel worksheet and computer based analysis was performed using the Statistical Product And service solutions (SPSS) 20.0 software (SPSS, Chicago Illinois, USA) and Microsoft Excel 2010. The categorical variables were summarized as proportions and percentages and continuous data as mean =/- standard deviation.

Specificity, Positive Predictive Value (PPV), Negative Predictive Value (NPV) and Accuracy were calculated.

ETHICAL CLEARANCE

The study has been conducted after approval from the Institutional Ethical Committee (H) of Assam Medical College and Hospital, Dibrugarh and each patient's signed consent following a translation of the study protocol into their native language.

WRITTEN AND INFORMED CONSENT

Written and informed consent (ANNEXURE III) was taken from each and every participant of the study.

In our study, “EVALUATION OF REVISED TRAUMA SCORE (RTS) AND GLASGOW COMA SCALE, AGE AND ARTERIAL PRESSURE (GAP) SCORING IN PREDICTING MORTALITY OF TRAUMA PATIENTS WITH SPECIAL REFERENCE TO HEAD INJURY PATIENTS IN A TERTIARY CARE CENTRE OF NORTH EAST INDIA” 150 patients presenting with head injury were studied.

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RESULT:

TABLE AGE DISTRIBUTION OF PATIENTS

TABLE 5.1 AGE DISTRIBUTION OF PATIENTS

Age in years	Number (n)	Percentage (%)
20-29	49	32.67
30-39	33	22.00
40-49	32	21.33
50-59	19	12.67
≥60	17	11.33
Mean±SD	38.35±14.16	

The mean age (mean±S.D.) of the patients was 38.35±14.16 years with range 20-65 years.
Maximum number of patients were in age group of 20-29 years.
Only 12% of patients were in the extremes of age group of > 50 years.

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TABLE GENDER DISTRIBUTION OF PATIENTS

TABLE 5.2 GENDER DISTRIBUTION OF PATIENTS

GENDER	NUMBER (N)	PERCENTAGE (%)
Male	121	80.67
Female	29	19.33
TOTAL	150	100.00
Ratio (Female: Male)	1: 4.17	

The proportion of males were found to be 80.67% compared to just 19.33% females. The ratio of Female and male was found to be 1: 4.17.

TABLE TREATMENT RECEIVED

TABLE 5.3 TREATMENT RECEIVED

TREATMENT RECEIVED	NUMBER (n)	PERCENTAGE (%)
Operative	20	13.33
Conservative	130	86.67
TOTAL	150	100.00

In our study, operative intervention was performed in 20 cases, whereas rest 130 patients were managed conservatively.

TABLE PRE HOSPITAL TREATMENT

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Table 5.4 PRE HOSPITAL TREATMENT

PRE HOSPITAL TREATMENT AT PHC/CHC	NUMBER (n)	PERCENTAGE (%)
Present	119	79.33
Absent	31	20.67
TOTAL	150	100.00

Out of the total 150 patients, 119 (79.33 %) had received prehospital treatment at PHC/CHC.

TABLE MECHANISM OF INJURY

TABLE 5.6 MECHANISM OF INJURY

MECHANISM OF INJURY	NUMBER (n)	PERCENTAGE (%)
FALL FROM HEIGHT	29	19.33
PHYSICAL ASSUALT	5	3.33
RTA	116	77.33

In our study 116 (77.33 %) patients had head injury following Road traffic accident (RTA), 29 (19.33%) had fall from height, 5 (3.33%) had physical assault.

TABLE TIME OF DEATH AFTER ADMISSION

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TABLE 5.7 TIME OF DEATH AFTER ADMISSION

TIME OF DEATH	Male		Female	
	N	%	N	%
<24 hour	4	9.52	2	4.76
24-48 Hours	4	9.52	1	2.38
48-72 Hours	5	11.90	0	0.00
72 hour – 7 days	18	42.86	2	4.76
7-14 days	3	7.14	1	2.38
14-30 days	2	4.76	0	0.00

Maximum number of deaths were noted between 3 -7 days (47.62%).

TABLE DISTRIBUTION OF RTS SCORE

TABLE 5.9 DISTRIBUTION OF RTS SCORE

RTS SCORE	NUMBER (N)	PERCENTAGE (%)
LOW RISK	81	54.00
MEDIUM RISK	69	46.00
HIGH RISK	0	0.00

In our study, RTS score classified maximum number of patients into low risk category (54%) and 46% into medium risk group.

TABLE DISTRIBUTION OF GAP SCORE

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TABLE 5.10 DISTRIBUTION OF GAP SCORE

GAP SCORE	NUMBER (N)	PERCENTAGE (%)
LOW RISK	89	59.33
MEDIUM RISK	55	36.67
HIGH RISK	6	4.00

In our study, GAP score classified highest number of patients into low risk category (59.33%), 36.67% patients into medium risk and 4% of them into high risk group.

TABLE DISTRIBUTION OF AGE WITH OUTCOME

TABLE 5.11 DISTRIBUTION OF AGE WITH OUTCOME

Age in years	SURVIVOR		NON SURVIVOR		p-value
	N	%	N	%	
20-29	40	26.67	9	6.00	
30-39	23	15.33	10	6.67	
40-49	22	14.67	10	6.67	0.0842
50-59	15	10.00	4	2.67	
≥60	8	5.33	9	6.00	

In our study highest mortality (20%) was seen in age group of 30 -49 years. However, no significant association was noted between age of the patient and outcome.

TABLE DISTRIBUTION OF GENDER WITH OUTCOME

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TABLE 5.12 DISTRIBUTION OF GENDER WITH OUTCOME

Gender	SURVIVOR		NON SURVIVOR		p-value
	N	%	N	%	
Male	85	56.67	36	24.00	0.3297
Female	23	15.33	6	4.00	

In our study, comparing the gender of the patient with the mortality, we found that the male patients had highest mortality (24%) compared to females (4%).

TABLE DISTRIBUTION OF PRE HOSPITAL TREATMENT WITH OUTCOME

TABLE 5.14 DISTRIBUTION OF PRE HOSPITAL TREATMENT WITH OUTCOME

Pre hospital treatment at PHC/CHC	SURVIVOR		NON SURVIVOR		p-value
	N	%	N	%	
Present	82	54.67	37	24.67	0.0985
Absent	26	17.33	5	3.33	

In our study majority of the patients who survived had received pre hospital treatment at PHC /CHC (54.67%). However no significant association was found between presence of pre hospital treatment and the outcome.

TABLE DISTRIBUTION OF MECHANISM OF INJURY WITH OUTCOME

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TABLE 5.16 DISTRIBUTION OF MECHANISM OF INJURY WITH OUTCOME

Mechanism of Injury	SURVIVOR		NON SURVIVOR		p-value
	N	%	N	%	
FALL FROM HEIGHT	22	14.67	7	4.67	0.7483
PHYSICAL ASSUALT	3	2.00	2	1.33	
RTA	83	55.33	33	22.00	

In our study, highest mortality of 22% was noted in patients who had met with Road traffic accident (RTA) compared to 4.67% in fall from height and 1.33% among physical assault group. However there was no significant association noted between mechanism of injury with outcome

TABLE DISTRIBUTION OF RTS SCORE WITH OUTCOME

TABLE 5.17 DISTRIBUTION OF RTS SCORE WITH OUTCOME

RTS	SURVIVOR		NON SURVIVOR		p-value
	N	%	N	%	
<3.5	0	0.00	0	0.00	<0.0001
3.4-7.2	29	19.33	40	26.67	
>7.2	79	52.67	2	1.33	

In our study, out of 150 patients, RTS score classified 81 into mild risk group out of which 2 patients (1.33%) had mortality, 69 patients were classified as moderate risk out of which 40 patients (26.67%) had mortality.

TABLE DISTRIBUTION OF GAP SCORE WITH OUTCOME

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TABLE 5.18 DISTRIBUTION OF GAP SCORE WITH OUTCOME

GAP	SURVIVOR		NON SURVIVOR		p-value
	N	%	N	%	
3-10	0	0.00	6	4.00	<0.0001
11-18	22	14.67	33	22.00	
19-24	86	57.33	3	2.00	

In our study, out of 150 patients, GAP score had classified 6 patients into high risk group and all of them had mortality, 55 patients into moderate risk group of which 33 patients had mortality.

TABLE SENSITIVITY AND SPECIFICITY OF RTS SCORE

TABLE 5.19 SENSITIVITY AND SPECIFICITY OF RTS SCORE

STATISTIC	VALUE	95% CONFIDENCE INTERVAL
SENSITIVITY	95.24%	83.84% to 99.42%
SPECIFICITY	73.15%	63.76% to 81.22%
POSITIVE PREDICTIVE VALUE	57.97%	50.08% to 65.48%
NEGATIVE PREDICTIVE VALUE	97.53%	91.04% to 99.35%
ACCURACY	79.33%	71.97% to 85.51

In our study, RTS score predicted mortality in head injury patients with sensitivity of 95.24%, specificity of 73.15%, positive predictive value of 57.97%, negative predictive value of 97.53% and diagnostic accuracy of 79.33%.

TABLE SENSITIVITY AND SPECIFICITY OF GAP SCORE

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TABLE 5.20 SENSITIVITY AND SPECIFICITY OF GAP SCORE

STATISTIC	VALUE	95% CONFIDENCE INTERVAL
SENSITIVITY	92.86%	80.52% to 98.50%
SPECIFICITY	79.63%	70.80% to 86.77%
POSITIVE PREDICTIVE VALUE	63.93%	54.74% to 72.21%
NEGATIVE PREDICTIVE VALUE	96.63%	90.56% to 98.85%
ACCURACY	83.33%	76.39% to 88.91%

GAP score demonstrated 92.86% sensitivity, 79.63% specificity, 63.93% positive predictive value, 96.63% negative predictive value, 83.33% diagnostic accuracy in predicting mortality in head injury patients.

DISCUSSION:

This cross sectional, non randomized study, which was carried out over a duration of one year, included 150 consecutive head injury patients attending the Surgery casualty of Assam Medical College and Hospital.

1. AGE: The highest number of patients (32.67%) were recorded in age group of 20-29 years in our study. The patient's mean age (mean±S.D) was 38.35±14.16. This data was comparable to other Indian studies seen below.
2. SEX: The proportion of males was found to be 80.67% in our study, which correlates with most of the studies worldwide which shows male preponderance for head injury. The female: male ratio was found to be 1:4.17.
PRE HOSPITAL TREATMENT AT PHC/CHC: In our study, 54.67% of survivor group had received prior treatment at PHC/ CHC before reaching our tertiary center.
Some people who survived the primary insult may nonetheless be permanently disabled. The majority of these results are associated with a significant proportion of secondary brain traumas occurring prior to hospital admission46–48.
Patients' outcomes are directly correlated with the important prehospital treatment of traumatic brain injuries. In the immediate aftermath of an injury, the brain is vulnerable to secondary brain injury due to cerebral edema, disruption of cerebrovascular autoregulation, and local cerebral ischemia. Prehospital interventions aim to minimize this kind of brain injury while maximizing

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cerebral physiology. If appropriate resuscitation attempts are given, secondary damage can be minimized and has a considerable effect the outcome.49
Chowdhury et al. in their study came to conclusion that, severe traumatic brain injury (TBI) patients have high death and morbidity rates, but early emergency management and pre-hospital examination can prevent negative outcomes. Therapy mainly involves correcting hypoxemia and hypotension, 76
improving intubation and ventilatory management, and using isotonic saline for fluid resuscitation46.

3.TREATMENT RECEIVED: In our study maximum number of patients were managed conservatively (86.67%) and operative management was carried out in 13.33% of the patients. 77

Regardless of GCS, current recommendations advise surgical removal for extadural hematoma (EDH) greater than 30 cm3. Patients with EDH and >15mm thickness of clot, GCS <9, > 5mm of midline shift, or focal neurologic deficits have to be evaluated for surgical management. Patients presenting with no focal neurological deficits and "GCS greater than 8, epidural hematomas <30 cm3, <15 mm thick, and with <5 mm of midline shift" can be monitored with consecutive imaging (7-8 hours after the prior scan, repeat the scan). In the event of a GCS less than 8 with sudden deterioration, an ICP less than 20 mmHg, or >1 cm thickness of subdural hemorrhage or conditions accompanied with a >5mm of midline shift, evacuation should be considered. Individuals having temporal or frontal contusions larger than 20 cm3 with GCS of 6-8, mass effect, refractory ICH, and parenchymal lesions with gradual neurologic impairment, lesion volume of >50 cm3 , midline shift of atleast 5mm/compression of cisterns should go for decompression

4. REVISED TRAUMA SCORE (RTS): In our study, out of 150 patients, RTS score classified 81 into mild risk group out of which 2 patients (1.33%) had mortality, 69 patients were classified as moderate risk out of which 40 patients (26.67%) had mortality.
RTS score had sensitivity of 95.24% and specificity of 73.15% in predicting mortality in our study.

Manoochechry et al. conducted a comparative study on Revised Trauma Scale (RTS) VS Kampala Trauma Score (KTS) where they found that RTS showed sensitivity of 82% and specificity of 91% in predicting death whereas KTS had a sensitivity of 88% and specificity of 73%

Farzan et al. in their study concluded that RTS score showed "100% sensitivity and 83.33% specificity" in mortality prediction in trauma patients

5. "GLASGOW COMA SCALE, AGE, ARTERIAL PRESSURE" (GAP) SCORE: In our study, out of 150 patients, GAP score had classified 6 patients into high risk group and all of them had mortality, 55 patients into moderate risk group of which 33 patients had mortality.

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In our study, GAP score had sensitivity of 92.86% and specificity of 79.63% in predicting mortality.

Yadollahi et al. in their investigation, they discovered that "GAP had sensitivity of 72.99% and specificity of 95.52% for predicting mortality in trauma patients".58
Quiros et al. in their study found that GAP demonstrated specificity of 88.9% and sensitivity of 94.9% in mortality prediction in patients of trauma.

SUMMARY
This cross-sectional study, conducted over a period of one year, included 150 head injury patients attending General Surgery emergency department and Neurosurgery department in Assam Medical College And Hospital, Dibrugarh.
The study aimed to asses and analyze GAP and RTS scoring system in predicting mortality in head injury patients.
The following were our observations at the end of the study period.
□□Head injury was noted to be most common in 20-29 years of age group.

□□Males were 4.17 times more likely than females to have encountered it.

□□Age had no statistically significant correlation with head injury.

□□79.33% of head injury patients had received prehospital treatment at PHC/CHC.

□□86.67% head injury patients were managed conservatively, whereas 13.33% were managed by surgical intervention.

□□Majority of the patients were transported through ambulance (78.67%).

□□It was discovered that most frequent cause of head injuries was road traffic accidents (77.33%), followed by fall from height (19.33%).

□□Aspiration pneumonitis with shock (76.19%) was most frequent cause of death in head injury patients.
81

CONCLUSION
The head injury severity can be objectively assessed with the aid of the injury scoring system, which attempts to quantify the damage. In this study we evaluated the two injury scoring systems the GAP and RTS scores in mortality prediction in patients of head injury in our tertiary care center of North East India.

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The results of this study highlight the significance of using a variety of predictive tools in clinical practice to ensure thorough risk assessment and stratification. The high sensitivity of RTS makes it a valuable tool for identifying patients who are at risk of death, and the higher specificity of the GAP score allows for more accurate patient outcome prediction. GAP score is easily implimented and simpler compared to RTS score taking into account the actual circumstances of medical practice in middle class and lower income nations. Additionally, our findings emphasize the critical role that prehospital treatment, timely transportation, and appropriate management strategies play in lowering the mortality rate among patients with head injuries.

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