REALITY ORIENTATION PROGRAM IN RLA STAGE 4 TRAUMATIC BRAIN INJURY PATIENTS

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CHENNAI

CERTIFICATE

CERTIFICATE

This is to certify that the research work entitled REALITY ORIENTATION PROGRAM IN RLA STAGE 4 TRAUMATIC BRAIN INJURY PATIENTS was carried out by Reg. No.411414001, KMCH College of Occupational Therapy, towards partial fulfillment of the requirements of Master of Occupational Therapy (Advanced OT in Neurology) of the Tamil Nadu Dr. M.G.R. Medical University, Chennai.

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ABSTRACT

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Aim

To find the effectiveness of Reality Orientation Program for RLA stage 4 traumatic brain injury patients.

Methods

20 patients were recruited for the study. Of which 10 patients underwent Reality Orientation Program (ROP) and 10 underwent Conventional therapy. The patients were administered with Galveston Amnesia and Orientation Test (GOAT), Mini Mental Status Examination (MMSE), Rancho Los Amigos Scale (RLA), Glasgow Coma Scale (GCS) and Glasgow Outcome Score (GOS). The study period was for 4 weeks, two weeks given by the therapist and family members (under the supervision of therapist) in the hospital and remaining two weeks orientation was provided by the family members either in home or hospital.

Results

The duration of Post Traumatic Amnesia (PTA) was reduced by 10 days for the patients who received ROP. Even though the results were not statistically significant perhaps were clinically relevant (p= 0.096). Correlation between age & GCS (r=.234), age & PTA (r=.242) and GCS & PTA (r=.050) showed no positive correlation. On comparison of the MMSE scores between groups it exhibited statistical significance at the end of fourth week. Other scales did not display statistical significance. On comparison of scales within the group it revealed high statistical significance. On comparing the significance of effectiveness it was found that MMSE scores had medium effect (ηp2=.070), GCS had very low effect ηp2=.000, small effect size (ηp2=.049) for RLA, and GOAT revealed medium effect (ηp2=.087) between group. Resolution of time, place and person in experimental group had a mean of 30, 22 and 14 days respectively whereas in control group the mean was 38, 23 and 17 days.

Conclusion

Length of PTA was shorter in the patients who received ROP. ROP included the orientation board which reduced the confusion of the therapist and burden on the family members and enabled them to participate more actively in the treatment.

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INTRODUCTION

INTRODUCTION

Traumatic brain injury (TBI) is a form of acquired brain injury that causes damage to the brain as a result of sudden trauma. (Solmaz I et al, 2009) It is regarded as "the most complex disease in the most complex organ", and distinguished by great heterogeneity in terms of etiology, mechanism, pathology, severity and treatment with highly varying outcomes. It may consist of diffuse damage, contusion brain damage or intracerebral hematoma. It is recognized that intrinsic pathophysiologic processes and systemic insults such as hypoxia and hypotension heightens the primary brain damage.(Lingsma HF et al, 2011) Sport, falls, motor vehicle accidents, assaults or blast injuries cause different types of injury (Maas et al, 2014).

The incidence of TBI is rising as a sequel of transport related injuries in low and middle income countries (Maas et al, 2014). Country-based incidence reported as 108 to 332 hospitalized new cases per 100,000 populations per year (Abelson- Mitchell, 2008). In India it is estimated that nearly 1.5 to 2 million persons are injured out of which road traffic injuries are the leading cause (60%) of TBIs followed by falls (20-25%) and violence (10%). (Gururaj G, 2002)

Traditionally, depending on the patient's presenting level of consciousness as expressed by the Glasgow Coma Scale (GCS) score TBI are classified into mild (GCS 13-15), moderate (GCS 9-12), or severe (GCS 3-8) (Teasdale G et al, 1974). Interestingly, the highest incidence of mild TBI is seen between the ages 15 to 24 years. In addition to this age group, men and women above the age 65 years are observed to have similar incidence of mild TBI (Jagoda AS et al, 2008).

Evidence suggests that many of the TBI survivors face problems with cognition, behaviors and mental health. (Khan F et al, 2003; Rosenthal M et al, 1990) One of the

main and common cognitive consequences following TBI is a state of confusion and disorientation which is referred to as post-traumatic amnesia (PTA). Subsequently, the ability to remember events after the onset of the condition is impaired leading to anterograde amnesia (Lezac M, 1995).

Several studies have reported that PTA is a very frequent disorder in patients with TBI and it remains one of the most important indexes for classification of injury severity after TBI. Moreover, the duration of PTA is shown to be one of the best early predictors of TBI outcome (Nakase-Richardson et al., 2009; Walker et al., 2010; Yap & Chua, 2008). In acute brain injury departments, 70% of TBI patients have PTA (Tate et al., 2006).

As TBI patients are emerging from a loss of consciousness, the patient's orientation and memory for ongoing events are poor. Which can lead to problems with interacting and engaging during the awakening and resulting in delayed transfer to intensive rehabilitation programs and, furthermore, to a prolonged hospitalization (Cicerone et al., 2005; Nakase-Richardson et al., 2009; Weir, Doig, Fleming, Wiemers, & Zemljic, 2006). Tate et al., 2006 and weir er at al., 2006 studies suggest that intensive rehabilitation should commence when the TBI survivor emerge from PTA. Further, it is used as a guideline for providing therapies. Therefore, PTA plays a vital role in planning and optimizing the need for early rehabilitation (Greenwald & Rigg, 2009; Greenwood, 1997; Jacobs et al., 2012).

The theory of PTA provides a useful account of the importance of therapies to tackle the memory issues of the TBI patients. A number of researchers have reported the effectiveness of Reality Orientation Program (ROP) in this field. The ROP is a cognition orientated technique for patients with memory loss and time-place disorientation. ROP is used when the patient had emerged from coma and/or was able to communicate at level 4 at the RLAS (Hagen et al., 1972/1997).The RO has, in several studies, produced documented effects in improving cognition, memory, thinking, and behavior in people

with dementia and in confused elderly people (Patton, 2006; Spector et al., 2003; Woodrow, 1998; Woods, Spector, Jones, Orrell,&Davies, 2005; Zanetti et al., 2002). In addition, in the TBI literature, RO has shown a positive effect on improved orientation skills (Corrigan, Arnett, Houck, & Jackson, 1985; Woods et al., 2005; Zencius,Wesolowski, & Rodriguez, 1998). The purpose of using ROP in our study is to reorientate patients by means of continuous stimulation with repetitive orientation to the environment.

This will be done using a 24-hour approach where patients will be stimulated with information about their surroundings with regard to time, place, and person in order to decrease their confusion and dysfunctional behavior. Besides this, this method will be used to improve their understanding of their surroundings. The ROP clipboard has clock, calendar, and poster which will be used to facilitate the orientation, and at least twice a day, ROP sequence will be performed. The orientation sequence contains six orienting statements including the patient's name; the visitor's name and relationship to the patient; the name of the hospital and the reason why the patient was at the hospital; the weekday, date, month, and year; the hour and period of the day; and the reason why the visitor had come. Even though it is standardized, it will also be individualized to meet the chief needs of each patient. The method calls for regular stimulation and repetition of basic orientation information (Corrigan J et al 1985; Woodrow P 1998). The approach will be carried out systematically and competently by Occupational Therapist and Relatives.

The involvement of family has been found very crucial in administering ROP. Existing research recognizes the critical role played by family. Interestingly, tertiary care settings have been described as substantial need for family-centered care (Mullin et al, 1999).The term " family" in TBI program denotes intimacy and concern that exists in relationships between patients their significant others. Involving family into the orientation program is of great significance for both the patient and the family. When family members are involved it also widens the scope and frequency of receiving standardized orientation.

(Thomas, H & Feyz et al 2003). Studies have shown that this increased involvement of family/carer's need not result in increased burden on families, if the proper supports are in place (Dean and Gadd, 1990). Hence it is essential for incorporating family members into the program in a tertiary health care setup for earlier recovery of the TBI patients.

In Indian population, TBI patients are great in number; therapist may be confused as to what therapy has to be given for PTA patients. Staff and family members have found it challenging and frustrating while treating agitated patients (Montgomery, Kitten & Niemiee, 1997). This is a particular area of concern for occupational therapist, who are responsible for early intervention in TBI patients.

Our intervention is inspired as there is no standardized protocol which is presently used in tertiary health care setup along with the family members. This could pave the path for bringing earlier recovery in patients with TBI so that it can be incorporated in the future. Therefore, a further study in this intervention strategy in similar TBI programs was required.

Research Question

Will ROP program improve orientation for RLA stage 4 TBI patients?

Does the level of consciousness and recovery affect the length of PTA?

OPERATIONAL DEFINITION

Traumatic Brain Injury

Traumatic Brain Injury is defined as any traumatically induced structural injury or physiological disruption of brain function as a result of an external force.

Post Traumatic Amnesia- Anterograde Amnesia

It is the deficit in forming new memory after the accident, which may lead to decreased attention and inaccurate perception. Anterograde memory is frequently the last function to return after the recovery from loss of consciousness.

Orientation

It is defined as the awareness of oneself in relation to the characteristics of one's surroundings: time, place and person.

Reality Orientation

Reality Orientation means interacting with patients about the patient's current environment and issues in their predicament.

AIMS AND OBJECTIVES

- To find the effectiveness of Reality Orientation Program for improving orientation among RLA stage 4 Traumatic Brain Injury patients.
- To study the relationship between Reality Orientation Program and recovery.

HYPOTHESIS

Alternate Hypothesis:

- Reality Orientation Program is significantly effective than Conventional Therapy in stage 4 Traumatic Brain Injury.

- There is relationship between Reality Orientation Program and recovery.

Null Hypothesis:

- Reality Orientation Program is not significantly effective than Conventional Therapy in stage 4 Traumatic Brain Injury.

- There is no relationship between Reality Orientation Program and recovery.

RELATED LITERATURE

Definition of Traumatic Brain Injury

Traumatic Brain Injury (TBI) is defined as any traumatically induced structural injury or physiological disruption of brain function as a result of an external force. It is manifested by one or more clinical signs occurring immediately afterwards including a loss, decreased, or altered level of consciousness, amnesia, neurologic deficit, or intracranial lesion. External forces may include direct impact of the head with another object, indirect forces from acceleration/deceleration, or a blast injury. The Glasgow Coma Score (GCS) has traditionally been used to classify TBI as mild (GCS 13-15), moderate (GCS 9-12), or severe (GCS 3-8). A more recent classification scheme for TBI uses length of loss of consciousness (LOC), alteration of consciousness (AOC), and post traumatic amnesia (PTA) as well as imaging findings to categorize TBI (Cifu et al, 2009).

Biomechanics

Traumatic injury results from the transfer of energy from the environment to tissue above the amount that can be absorbed without dysfunction. Traumatic insults generally occur over short periods of time and are referred to as dynamic loading. Dynamic loading includes both direct or impact loading, as well as impulsive loading where no physical contact occurs. The loads absorbed by the brain after trauma generally include linear and rotational components called angular loads. The rate and duration of the insult are important because loads applied at high rates tend to result in more damage (Laplaca et al, 2007). Focal injury such as contusion results from direct loading and often occurs in the absence of widespread injury. In contrast, diffuse axonal injury (DAI) often occurs as a result of the rotational acceleration accompanying indirect loading. (Gennerelli et al, 1982) Humans are particularly susceptible given their large cranium connected to the trunk by relatively weak neck musculature. Rotational acceleration produces substantial

and widespread strains within the brain resulting from both acceleration and deceleration. These diffuse strains lead to differential movement of the brain relative to the skull which can cause hemorrhage. Shear strain is most prominent after rotational injury, and brain tissue is particularly sensitive to this type of strain. (Holbourn, 1943)

Pathophysiology

The initial traumatic insult results in mechanical damage including rupture of cellular and vascular membranes with release of intracellular contents, ultrastructural damage of axons, and changes in cerebral blood flow (McIntosh TK, 1994; Werner & Engelhard, 2007). Subsequent metabolic derangement includes widespread release of excitatory neurotransmitters such as glutamate, severe dysregulation of calcium homeostasis, energy failure due to Adenosine triphosphate (ATP) depletion, free radical generation, and cell death by necrotic and apoptotic pathways (Werner C et al, 2007;Thompson HJ et al, 2005). More global consequences of the traumatic insult include increased intra-cranial pressure, decreased cerebral blood flow, tissue ischemia, cerebral edema, and functional blood brain barrier dysfunction (Statler KD et al, 2001; Marklund N et al, 2006). Following the initial damage, repair and recovery processes begin through the removal of cellular debris, glial scar formation, and plastic changes in neural networks (Gulf War and Health: Volume 7)

Putative Causes of Altered Consciousness in mild TBI

The definitive causes of altered consciousness are not known. Loss of consciousness requires either loss of the function of both cerebral hemispheres or of the reticular activating system. Several plausible hypothetical mechanisms have been proposed for the alteration of

consciousness that occurs with mild TBI. These include the reticular, pontine-cholinergic system, centripetal, and convulsive hypotheses. The reticular activating system (RAS) resides in the brainstem reticular formation which extends from the top of the spinal column to the rostral midbrain with extensions into the thalamus and hypothalamus. The

RAS is excited by input from surrounding sensory tracts and transmits this excitation to the cortex to induce generalized cortical and behavioral arousal. In the absence of input from the RAS, consciousness is impaired.

Under the reticular hypothesis of concussion, loss of consciousness after brain trauma results from a disturbance or depression of the activity of polysynaptic pathways within the RAS. It is not completely understood how a traumatic dysfunction of the RAS occurs however it is believed to result from shearing or tensile strains on RAS pathways at the cranio-cervical junction. Neuropathological evidence for this is limited. The hypothesis also fails to address traumatic amnesia. A further difficulty is that Electroencephalogram (EEG) findings do not support depression of the RAS in concussion.

The pontine-cholinergic system hypothesis differs from the reticular activating system hypothesis in that RAS dysfunction is thought to occur as a consequence of trauma-induced activation of the inhibitory cholinergic system of the dorsal pontine tegmentum (Hayes RL et al, 1989). Furthermore, EEG studies show widespread neuronal discharge after concussion and elevated acetylcholine is found in the Cerebrospinal Fluid (CSF) of patients after TBI. However, it is not clear that activation of this system can produce loss of consciousness due to RAS suppression.

The centripetal hypothesis posits that sudden rotational forces cause shearing strains and stresses that result in functional decoupling of nerve fibers (Ommaya & Gennarelli, 1974). The depth of this functional decoupling is directly related to the extent of rotational acceleration delivered to the brain.

Also, with greater rotational acceleration the likelihood of mechanical injury to fibers increases. Lower inertial forces that result in functional decoupling between the subcortex or diencephalon and the cortex may result in amnesia or confusion without loss of consciousness (LOC). Furthermore, greater forces resulting in decoupling between more superficial structures and the mesencephalon result in LOC. This hypothesis nicely

explains post-traumatic amnesia and dazed states, however it also requires very high energy injuries to cause full loss of consciousness. Consequently, patients with LOC would often have accompanying structural brain injury which is simply is not observed.

Patients with concussion have similar symptoms to those who have experienced generalized epileptic seizures or electro convulsive therapy (ECT). This overlap of symptoms has led to speculation that similar pathophysiological events occur in all three conditions. (Ishige N et al, 1987;Marmarou A et al, 1994). According to the convulsive hypothesis the symptoms associated with concussion are due to direct injury to neurons resulting in hyperexcitability and widespread membrane depolarization followed by neuronal exhaustion (Walker AE et al., 1994). These two neuronal states correspond to the convulsive and paralytic phases, respectively.

The convulsive hypothesis is able to reasonably account for a broader range of postconcussive behaviors than its competitors including LOC, amnesia, convulsive movements, autonomic disturbances, and the dazed or "dinged" state (Shaw NA., 2002). While this hypothesis does a better job than the others at providing a unified explanation for the broad range of symptoms observed as an acute result of mild TBI, it does not account for the structural abnormalities that occur as a result of mild TBI. In summary, none of the individual hypotheses currently available explain all the findings seen with mild TBI. Given the often complimentary strengths and weakness discussed above, it seems likely that the mechanisms of altered consciousness after TBI may be due to a combination of processes.

TBI can cause long term cognitive, behavioural, and physical disability. Cognitive and behavioural changes, difficulties maintaining personal relationships and coping with occupational roles are typically reported to be more disabling than physical deficits (Nott, Chapparo, & Baguley, 2006) One of the cognitive consequences of TBI is a transient state of confusion and disorientation referred to as post-traumatic amnesia (PTA). A

characteristic of this state is anterograde amnesia, which is the impaired ability to remember events after the onset of a condition (Lezac M, 1995).

The duration of PTA the best indicator of traumatic brain injury severity (Teasdale & Jennett, 1974) and the most dependable marker of outcome prediction,(Bishara SN et al, 1992; Haslam C et al,1994) even in mild cases(Stuss DT et al, 1999;Crovitz HF et al, 1983). While variously described by different investigators, PTA includes impaired orientation, that is, retrograde amnesia and anterograde amnesia (Shores EA et al, 1989). Posttraumatic amnesia may be divided into 2 types. The first type of PTA is retrograde, defined by Cartlidge and Shaw as a ‘‘partial or total loss of the ability to recall events that have occurred during the period immediately preceding brain injury.’’ (Cartlidge & Shaw,1981)

The duration of retrograde amnesia usually progressively decreases. The second type of PTA is anterograde amnesia, a deficit in forming new memory after the accident, which may lead to decreased attention and inaccurate perception. Anterograde memory is frequently the last function to return after the recovery from loss of consciousness (Russell WR, 1932). Memory and new learning are believed to involve the cerebral cortex, subcortical projections, hippocampal formation (gyrus dentatus, hippocampus, and parahippocampal gyri), and the diencephalons, especially the medial portions of the dorsomedial and adjacent midline nuclei of the thalamus (Ross, 1997). In addition, frontal lobe lesions may cause alterations in behavior, including irritability, aggressiveness, and loss of inhibition and judgment. Recently, evidence has been presented that the right frontal lobe plays a prominent role in sustained attention.

Patients with TBI suffer initial cognitive-communication deficits characterized by confusion and disorientation. As well, many of these same patients manifest affective and behavioral problems along a continuum from agitated/impulsive to depressed/ withdrawn.

This article will describe an innovative standardized interdisciplinary approach based on the concepts of reality orientation, (Manzi & Weaver, 1987) which is hoped to improve the patient's awareness of and interaction with his or her environment during the early phase of rehabilitation in an acute care hospital.

Innovations in medical technology for rehabilitation following TBI have increased the number of survivors, and the total rate of TBI related hospitalization has increased. In spite of such technological innovations, the rate of TBI related hospitalization for severe TBI has constantly increased up to 20 percent over time. The peak incidence of TBI occurs in young adulthood. Males between the ages of 15 and 24 are at a much greater risk for death from TBI because they are more actively involved in driving a car and are involved in more car accidents, which is the most common cause of TBI (Thurman D et al, 1999)

Reality orientation is a technique that was developed in 1958 by Folsom (Folsom 1967) of the US Veterans Hospital in Kansas to improve a patient's orientation, social skills, and social awareness. Sessions can be performed individually (the "informal" approach) (Woodrow P, 1998) or in groups (the "formal" approach) (Barnes J., 1974). The protocol involves regular stimulation and repetition of basic orientation information. Reality orientation has been widely used in the treatment of confused elderly people, although it was initially designed to rehabilitate severely disturbed war veterans. (Taulbee & Folsom, 1966)

This technique has been used with patients with TBI who show signs of confusion, disorientation, or difficulty interacting with their surroundings.(McNeny R, Dise., J1990; Zencius A., et al 1998) Results of studies on the effectiveness of reality orientation in the geriatric population are mixed, with some articles reporting benefits,(Spector A., et al, 2000; Holden P & Woods R, 1995) whereas others do not.(Woodrow P, 1998;Jonea A, 1993) The application of reality orientation for patients with dementia is often

contraindicated; rather, emphasis is frequently placed on “validation” or “resolution” therapies for this patient population(Woodrow P, 1998).

The use of reality orientation for patients with TBI who are in the early stages of their recovery is frequently recommended,(McNeny R & Dise J, 1990) but more research needs to be done to determine the effectiveness of this approach with the population of acute care patients with TBI. The process of repetitive information to the patient regarding person, place, and time provides the basis for reconstruction of an environmental framework of understanding. Intensive information is given to the patient in one format of reality orientation during the first twenty-four hours. Twenty-four hour reality orientation provides a means of structuring the environment throughout the twenty-four hour period so that all persons having contact with the patient intervene appropriately and consistently. The patient is given information concerning person, place, and time so that following reality orientation therapies will support initial learning.

RO can be of a continuous 24-hr type, whereby staff involve the patients in reality-based communication in every contact throughout the day, or “classroom RO,” where groups of people meet on a regular basis to engage in orientation-related activities. A prominent focus of classroom RO is often the “RO board,” which typically displays information such as the day, date, weather, name of next meal, and other details (Holden & Woods, 1995). There have been a number of studies on classroom RO since Taulbee and Folsom (1966), many reporting positive findings.

For example, improvements were reported in “orientation to reality and in motivation toward self-care, responsibility and social involvement” (Salter & Salter, 1975, p. 406). Controlled studies have shown varied results. Some authors have found that classroom RO can lead to some improvements in cognitive function, with no effect on behavior (e.g., Hanley, McGuire and Boyd, 1981), whereas others have found positive effects on behavior, with no significant changes in cognition

It may take the form of a formal "class" type session led by speech therapists and occupational therapists (and sometimes by nurses) or of a "24 hour" approach to care implemented by either formal or informal carers of the elderly It aims to prevent and even reverse disorientation of dependent old people who show signs of dementia or general confusion as to their identity and current location m time and space RO relies heavily on verbal interaction for its operation, although general sensory stimulation is also used m therapy Holden and Woods (1982) describe 24 hour or informal RO as the continual process whereby staff present current information to the person In every Interaction, reminding the patient of time, place and person, and providing a commentary on events Confused and rambling speech is not reinforced. The environment is structured with signs and cues to help the person remain aware of the surrounding.

There is also a third form of RO called "Attitude Therapy" which accompanies either of the two approaches described above. It involves the use of "kind firmness, active friendliness, passive friendliness, matter of fact and no demand" (Holden and Woods, 1982) which are supposed to be selectively applied according to the individual needs of the patient.

To date, it seems that academic research into the use and effectiveness of RO has emanated largely from psychology and psychiatry (McMahon 1988), with formal carers looking to these areas for information and guidance. Current opinion seems to be ambivalent, with many authors acknowledging that RO has no theoretical base (Holden and Woods 1982), and that any success it has may well be attributable to the generally morale-lifting effects of increased stimulation and attention, rather than to any specific techniques involved in RO therapy RO is nevertheless commonly used by occupational therapists, speech therapists and nurses m formal care settings, perhaps if only because there appears to be no other treatment available for confusion (McMahon 1988) and because there is at least some evidence that RO can be beneficial. Some argue that, if

nothing else, it has in its favor that it encourages some kind of interaction between carers and patients (Duffy, Leeming, and Bracey 1988)

Despite the fact that RO is mainly a verbal and interactive therapy, it seems that so far the language sciences have not contributed to debates about its value It 1s the purpose of this article to begin to correct that lack by applying an interactional sociolinguistic perspective to the appraisal of RO, it 1s my belief that sociolinguistic research provides additional reasons to review the effectiveness of RO m the institutional context It may provide useful additional scientific "ammunition" for those clinicians who express reservations about the widespread use of RO as a panacea for the confused elderly (e g , Morton and Bleathman 1988, McMahon 1988) The intention is to give clinicians the benefit of a fresh disciplinary look at current practice as well as to make some small contribution to the critical application of sociolinguistic findings to real contexts and social issues (c f , Fairclough 1989, van Dijk 1990) Furthermore, such a language-based approach to researching the health and well-being of the elderly has recently been called for and supported by social gerontologists (e g , Wiemann et al 1990, Nussbaum 1993, Rook 1995; Coleman 1995) Nussbaum (1993) for example states that "the study of language can help to broaden our knowledge of the interactive difficulties experienced within the nursing home and can lead to communicative interventions that change relationships".

REVIEW OF LITERATURE

Reality orientation is a technique that was developed in 1958 by Folsom of the US Veterans Hospital in Kansas to improve a patient's orientation, social skills, and social awareness. Sessions can be performed individually (the "informal" approach) or in groups (the "formal" approach). It employs a standardized protocol involving regular stimulation and repetition of basic orientation information. It has been used as a mainstream treatment modality for improving orientation, memory etc in various conditions such as dementia, Alzheimer's disease, geriatric patients. And also have been used extensively among TBI patients' specifically amnesic ones.

ROP as an interaction in various disease conditions

Barnes J, 1974 assessed the **Effects of Reality Orientation Classroom on Memory Loss, Confusion, and Disorientation in Geriatric Patients.** Barnes has demonstrated with formal approach of Reality Orientation (RO). It was developed for the treatment of geriatric patients with moderate to severe degree of memory loss, confusion, and disorientation. It was intended for elderly patients who do not benefit from a remotivation program. RO helped the patients in two ways; first the patient was presented with fundamental information and was stimulated unceasingly. The patients are placed in a group where they get together and compete with each other patients, which thereby extricates them from isolation and leads them back to environment. Twelve geriatric patients were selected for the study in which 6 patients had appeared for all RO classes for a period of 6 weeks (6 days a week) and each class lasting for 30 minutes. The mean age of the 2 male and 4 female patients who completed the program was 81 years. A "reality orientation board" was used for the classroom instruction and all the selected patients were able to read. The board listed the name, location, date, weather, and other basic information. Basic information of each patient was collected through a

questionnaire which was developed for the same purpose. The questionnaire composed of 23 questions which were answered by patients and 5 questions answered by the nursing director. Questionnaire was administered at the beginning and at the end of the control period, at the beginning and end of the experimental period, and one week after the termination of the reality orientation classes.

Results displayed nonsignificant changes in the patient's responses and indicated that the reality orientation classroom technique did not produce marked changes during the 6-week period of application. However, the trend was toward significance, and a longer period of therapy might have revealed better results. Fascinating improvements occurred in the behaviours but this again didn't obtain statistical significance.

Jones A, 1995 investigated **How effective is Reality Orientation for elderly, confused patients?** He had examined the two forms of reality orientation: Groups (Formal) and 24-hour (Informal) reality orientation. The Formal approach entails a group of patients and encouraging them actively to rehearse selected orientation information. It involves three to six patients based on the impairment level and one hour session daily. In the Informal approach/ 24-hour approach, patients are stimulated with information about their surroundings in regard to time, place and person. Author has explained that desired outcome can be achieved from both forms of reality orientation, but expanded analysis has been done on formal approach than informal approach. The reality orientation therapist perceived that within the study that low level of functioning patients benefited less than the highly rated patients. Informal approach was pinpointed effective than the formal RO. From the literature it can be concluded that formal reality orientation was effective in promoting some degree of change, but the results were inconclusive in regards to repeated studies. This was due to changing client samples, and different measuring tools and environments. There are methodological problems in the studies reviewed, as most have a small sample size and there was a noticeable absence of followup tests to assess the stability of the change. This was akin to informal approach as

this has the problem of being difficult to assess and the feasible suggestion that the improvements are due to other factors.

Woodrow P, 1998 has explored **interventions for confusion and dementia: Reality Orientation** (RO). Woodrow has described strengths and weaknesses of Informal RO, where the intervention is given individually. Few strengths as mentioned by author are, older literature identified improvement in staff attitudes to patients when RO was used and also improved care and quality of life. In institutionalized environments where there has been paucity in human interaction and reduced care for patients with disorientation has shown increased benefits by using this type of intervention. He has recorded weaknesses from several other studies as RO boring and under stimulating and inflexible. The author has quoted study done by Jones (1992), who suggested that RO becomes increasingly difficult as dementia progresses, concluding that RO was only beneficial in the early stages of the condition. It dehumanizes and results in task oriented problems when it is used in a robotic and ritualistic manner.

Spector A et al, 2000, had done a systematic review of **Reality orientation for dementia**. Psychological scales measuring cognitive and behavioural changes were examined. A total of 125 subjects (67 in experimental groups, 58 in control groups) from 6 RCTs were analysed. Results had 2 divisions they are cognition and behaviour. Results from cognition were more precise, due to a sample size of 125, compared to 48 for behaviour. Results showed that RO had a significant positive effect on cognition and behaviour. This systematic review established that formal RO had clear benefits to dementia sufferers in both cognitive and behavioural domains, suggesting that RO techniques should be considered as part of a more general dementia care programme. The prolonged effects of RO after the end of treatment was debatable besides continued programme may perpetuate potential benefits.

Onder G et al, 2005 determined the **Reality orientation therapy combined with cholinesterase inhibitors in Alzheimer's disease through randomised controlled trial.** The authors have evaluated the effectiveness of a long-term (25 weeks), home-based programme of reality orientation on cognitive function in a group of patients with Alzheimer's disease receiving treatment with cholinesterase inhibitors as there was no previous literature on the same. Inclusion of National Institute of Neurological and Communicative Diseases and Stroke and the Alzheimer's Disease and Related Disorders Association (NINCDS–ADRA) criteria for probable Alzheimer's disease, scored between 14 and 27 on the Mini-Mental State Examination, did not present with major aphasia or blindness, and had received pharmacological treatment with donepezil for at least 3 months. A total of 156 eligible patients were enrolled and were randomly assigned in a 1:1 ratio to receive either a reality orientation programme at home, provided by caregivers, or no treatment. The standardized measure used for patients included MMSE for cognitive function and the Alzheimer's Disease Assessment Scale – Cognition; functional status was measured with the Barthel index and Instrumental Activities of Daily Living; behaviour; and medications used. Caregivers' assessment included mood measurement with the Hamilton Rating Scales for Depression and Anxiety; quality of life; and burden of care. Caregivers were instructed to provide three orientation sessions per week, for 25 consecutive weeks. Each session lasted about 30min and consisted of an organised, intensive cognitive training during which the caregiver gradually presented information such as date, time and location. Besides the formal reality orientation sessions, caregivers were also invited to stimulate and involve patients in reality-based communication two or three times throughout the day informally, focusing on personal, time and space orientation and discussing news or topics of general interest. This study revealed that among patients with Alzheimer's disease, a home-based programme of reality orientation therapy provided by the patients' caregivers can enhance the effects of cholinesterase inhibitors on cognitive function and that this effect was independent of baseline cognitive status. This intervention does not seem to modify caregivers' psychological status and quality of life. The results confirmed the long term beneficial

effects of reality orientation on cognitive function reported by previous trials of shorter duration, and suggested an additive effect of reality orientation when combined with anticholinesterase therapy. The fascinating part in the study was that it had a formal reality orientation approach, based on lessons given by caregivers on a regular basis during the week, with an informal approach, based on repetition of orientation information at all times throughout the day with no fixed schedule. They have disclosed that a home-based programme of reality orientation provided by caregivers improves cognitive function, enhancing the effect of anticholinesterase treatment.

Other therapies for improving Orientation

A. H. Zencius et al, 1998 evaluated **improvement of orientation in head injured adults by repeated practice, multi-sensory input and peer participation.** It was tested in two studies, the first included a 23-year-old male who was treated by presenting the orientation questions orally while being shown questions on written flashcards. Results suggested that correct responses to orientation questions only occurred when flashcards were coupled with oral questioning. The participant responded correctly to nearly 100% of all orientation questions within 2 weeks of initiating flashcards. In the second study, a 19-year-old male was asked to respond in writing to 20 orientation questions in a small group. The group had a leader and 4 TBI patients. The group members who correctly answered the orientation questions, took turns in reading orientation questions and providing the correct responses. In the first study, flashcards were used (visual stimulation) to supplement verbal prompting (auditory stimulation) which, in turn, facilitated the correct responses to orientation questions. Visual stimulation was used usually in the form of printed material (flashcards, checklists, notebooks) to supplement verbal prompting by staff in order to increase compliance. If a patient was noncompliant (usually to verbal prompting), staff were encouraged to use an additional sensory modality (usually visual) to augment the verbal instruction. Multi-sensory input was also

used to facilitate memory. The application of multi-sensory input as a clinical procedure was based on the research literature of other disciplines like educational psychology.
In the second study, several procedures were used, including writing the correct answers, reading the correct answers and obtaining help from peers. Both studies represented other successful applications of non aversive antecedent control techniques to assist patients regain normal functioning. There was a paucity of empirical data in the research literature demonstrating the effectiveness of various strategies for treating orientation deficits. They have recommended for more research in the areas of assessing and treating disorientation both in the acute and post-acute settings including various combinations of multi-sensory input.

ROP for TBI patients

Kaschel R, et al 1995 evaluated **Reality orientation training in an amnesic: a controlled single-case study *(n* = 572 days).** Two studies with head-injured patients have been carried out as there was little information available concerning ROP other than elderly or demented patients. Use of uncontrolled designs made it difficult to draw conclusions from these papers. The authors described that ROP are attractive in neuropsychological rehabilitation as orientation problems are frequent in non progressive types of brain damage and they require treatment. They have also summarized that ROT avoids shortcomings of other approaches to memory rehabilitation as relevant memory problems are tackled directly, i.e. in the setting in which they occur. In 24 h ROP, orientation was modified in everyday situations and the day-by-day change was documented. Thus, the literature suggested that target-specific ROP for disoriented non-demented patients could prove effective.

This study replicated ROP reports for temporal reorientation in a non-demented patient. Substantial changes in all items could be demonstrated as compared to small gains in a non-target behavior. Results showed generalization of home training to clinic ROP tests,

i.e. another situation (home), person (supervisor) and retention of gains (time interval: training at home vs ROT tests in the clinic). There were pros and cons to the use of a family member as therapist. However, in this case it did mean that the patient received much more 'therapy' than he would have done were he relying on the health services. Small gains in such a 24 h ROP are usually greater than in classroom ROP. Furthermore, no equipment were required, the programme was involved in routine activities and fostered more behavioural change than was possible in a classroom atmosphere. There was evidence for improvement of functional status. As a summary, the 'investment' of 27 ROP sessions administered by a student (supervisor) and lasting 15 min each-10 min for supervision of the spouse and 5 min for tests gave a mean improvement in ROP tests of 43% (supervisor/clinic) and 29% (spouse/home). The change was not dramatic, but influenced daily living. They had suggested for booster sessions as there was not much item improvement after withdrawal of professional supervision, despite continued ROP.

Thomas H et al, 2003 developed an innovative standardized approach **North Star Project Reality orientation in an Acute Care setting for patients with Traumatic Brain Injury**. It was aimed to improve the TBI patient's awareness of and interaction with their environment during early phase of rehabilitation. They have defined three concepts such as Environment, Consistency and Standardization. Environment: The reality orientation footboard was located in the footboard of the patient's bed. It was available for the patients immediately wherever they are in the room. Consistency: Whoever got involved with the confused patient are valuable participants in creating environment. They are considered to provide repetitive and uniform appropriate interaction to the patients. Standardization: The North Star Project provides standardized orientation sequence protocols for staff and for family. Selection process of patients included a score of less than 76 on the Galveston Orientation and Amnesia Test (GOAT). A minimum of level IV, on the Rancho Los Amigos Scale of cognitive functioning.

De Guise. E et al, 2005 evaluated **the effect of an integrated reality orientation programme (North Star Project) in acute care on the duration of post-traumatic amnesia (PTA) of patients suffering from traumatic brain injury (TBI)**. A total of 12 patients met the inclusion criteria, who were part of the North Star Project was compared with 26 patients who were in control group. Control group patients were recruited by reviewing medical charts, who suffered from PTA and who were not a part of ROP. These patients underwent same level of medical and professional rehabilitation services as the other group. Orientation was provided in non-systematic manner and without material aids. They administered GCS and GOAT to assess the duration of PTA. Results revealed that length of PTA was shorter by 5 days for the North Star patients. This result was not statistically significant (p=0.19) but is clinically relevant. No between-group difference was found for Glasgow Coma Scale.

Even though there was lack of statistical significance, it had some benefits to staff and family members. The Consequences of shorter PTA would result in increased and more appropriate patient interaction and earlier transfer to rehabilitation. Further study is required to evaluate this intervention strategy to improve orientation for the patient with TBI.

Langhorn L et al, 2015 examined the **effectiveness of a systematic reality orientation program, introduced in a neurointensive care unit (NICU) on duration of posttraumatic amnesia (PTA) in TBI patients**. He explains that lack of memory and orientation result in difficulty while interacting and engaging during awakening and stay in NICU leading to postponed transfer to intensive rehabilitation, thereby prolonging hospitalization. PTA period has been considered as ‘‘waiting period’’ were no active therapy takes place. Focus was on prognostic use of PTA rather than trying to decrease or prevent early cognitive problems after TBI in the previous literature. Only one retrospective study has shown an impact on the length of PTA related to improved orientation and recovery according to the author’s knowledge. So the author’s decided to test the RO program prospectively on acute recovery in NICU and with more number of

participants. This is a quasiexperimental, prospective design. They had taken moderate to severe injury TBI patients who scored less than 12 in GCS. 24 patients were in intervention group who underwent ROP and 38 patients who underwent conventional rehabilitation program in control group. The Rancho Los Amigos Score was used to assess the cognitive level and the Galveston Orientation and Amnesia Test was used daily to assess orientation and duration of PTA. The Glasgow Outcome Scale Extended was then used as an indicator of clinical outcome after 12 months.

The results indicated that patients who received the RO had a higher mean of the Glasgow Outcome Scale Extended (SD = 1.53) than those receiving the usual care (SD = 1.35) despite that the groups differed significantly (p = .01) in PTA duration. They have concluded that TBI patients may gain more from early assessment and ROP intervention. The RO may aid patients with PTA to regain orientation and interact with their surroundings in the neuro intensive care unit to optimize the recovery. However, further studies with focus on timing, intensity, and duration are needed to evaluate the influence of an early RO approach on PTA and outcomes in patients experiencing TBI.

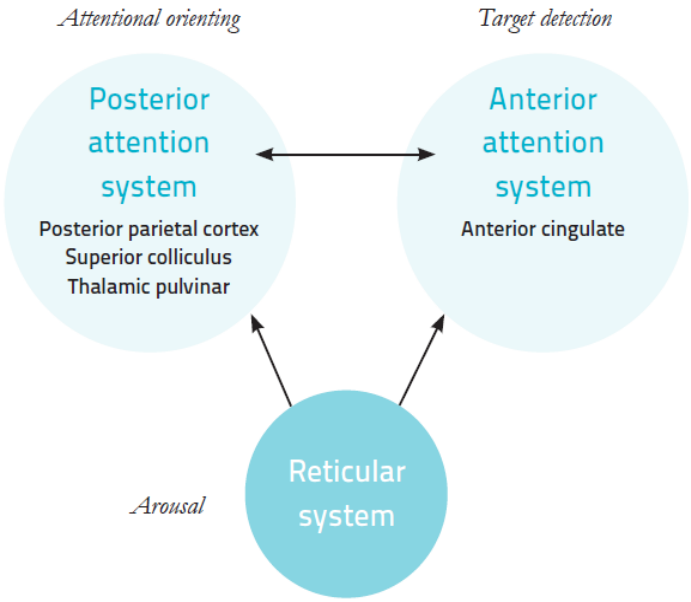
CONCEPTUAL FRAMEWORK

The ROP was a therapy which was initially developed for elderly and dementia patients. Recently they have standardized the protocol for patients with PTA after TBI. This program includes flexible model of external aids which is based on the Posner and Petersen's model of attention (1990). In the model of Posner and Petersen, they describe that attention is an independent cognitive module. There are three components of attention namely alerting, orienting and executive control which carries different function and has distinct brain networks (Posner and Petersen, 1990)

The prior component Alerting refers to preparation of an upcoming stimulus through increased and sustained arousal (Posner and Petersen, 2012). The process of selecting items for further processing refers to Orienting. There are two types of orienting namely overt orienting and covert orienting (Hunt & Kingstone, 2003).

Overt orienting refers to selectively attending to a stimulus by moving eyes to the stimulus while on the contrary covert orienting refers to selectively paying attention to a stimulus without movement of the eye. Primary cortex area and midbrain regions are engaged for overt type of orienting (Milea & Muri, 2004). There could be overlap in the cortical regions for both the orienting (Morgan & Rorden, 2008).

Another type of orienting exist which is the top-down orienting and bottom up orienting (Corbetta & Shulman, 2002). When a person voluntarily attends to a certain feature of stimuli is the top down orienting which is otherwise denoted as goal driven (voluntary) attentional system. Bottom-up orienting refers to stimulus driven (involuntary) system that automatically draws attention. Dorsal and ventral cortical networks are involved in this type of orienting (Corbetta & Shulman, 2002). For orienting, a visual location is used as a model. For detecting, we focus on reporting the presence of a target event.



Petersen & Posner Attentional Model (1990), in which Ben Yishay´s Orientation Remediation Model is based.

Attention and orientation are interdependent on each other. Attention is needed for a person to focus and process the information (Posner & Petersen, 1990). In Reality orientation, visual models are coupled with auditory cues to draw the attention of the patient. For identification and localization, both auditory and the visual systems are interconnected and work together. (King A 2009) There is an increased work done with these systems. Focusing on the target event takes place followed by identification of information from sensory processing systems along with information stored in the memory (Posner 1978). In summary, orientation program coupled with visual and auditory inputs fastens the process of recovery and makes it less overwhelming for patients.

For PTA extending more than 30 min are suggested to receive a systematic intervention which should be provided as intensively as possible (Turner – Stokes 2008).Orientation is improved in an acute patient when it is given in a structured environment. According to

Allen, when the environment is blended according to the functional level of the patients then it increases their participation thus, improving cognitive functions at a faster rate (Allen & Bertrand, 1999). ROP has blended according to this concept and created an environment which is feasible for the client always through the footboard (Thomas H et al, 2003).

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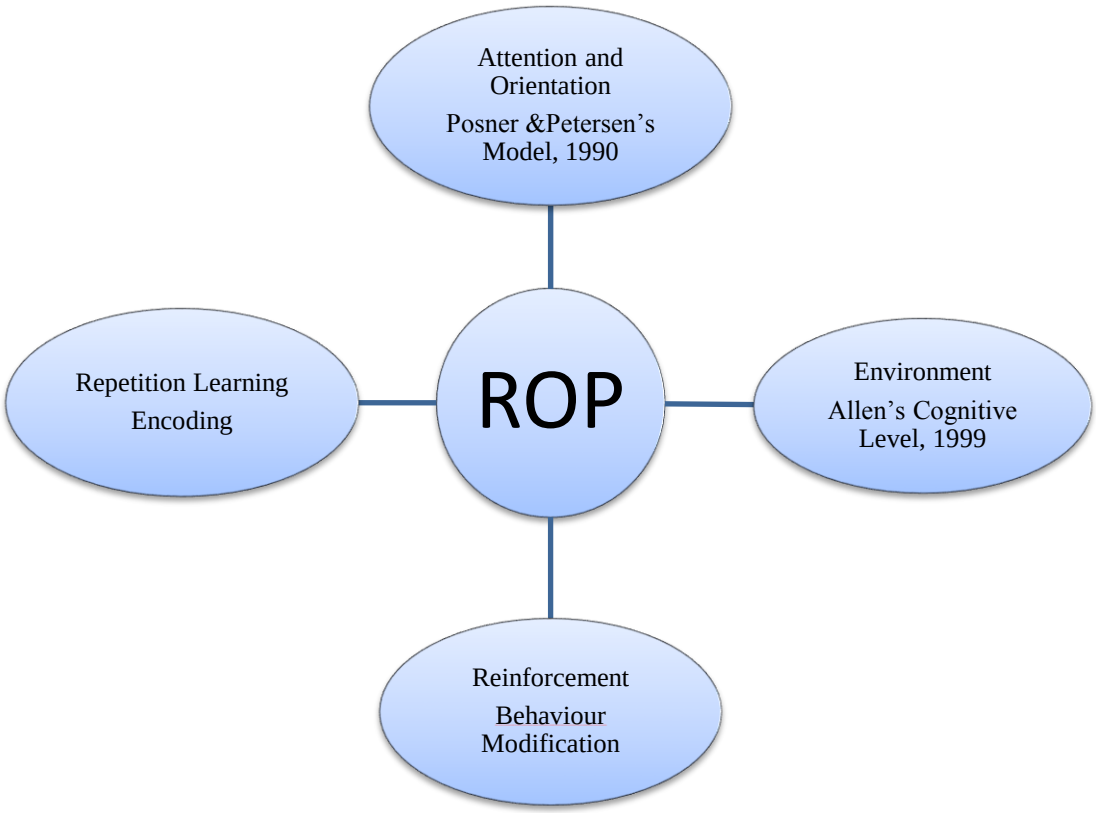
When patients are in a confused state, they tend to show very less interest in activity participation. Hence, in such cases every small response should be reinforced in a positive manner. This generates a sense of wellbeing and meaningfulness. The ultimate performance goal of reality orientation is that patients are oriented and able to function in environment (Langston, 1981)

When the stimulus is provided in repetition for longer duration it will result in registration of information. Literature shows that repeated learning effects during encoding and retrieval. Nevertheless, encoding develops earlier and survives for a longer duration. (Li, Guo & Jiang, 2008) And this repetition when indulged in something functional enhances the process of neural plasticity which is the ultimate rationale behind all treatment approaches. This domain was also integrated into ROP under the concept of consistency were everyone who intervenes with the patient provides a uniform and structured information which will result in encoding (Thomas H et al, 2003)


Attention and Orientation
Posner &Petersen's Model, 1990
Repetition Learning
Encoding
ROP
Environment
Allen's Cognitive Level, 1999
Reinforcement
Behaviour Modification

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METHODOLOGY

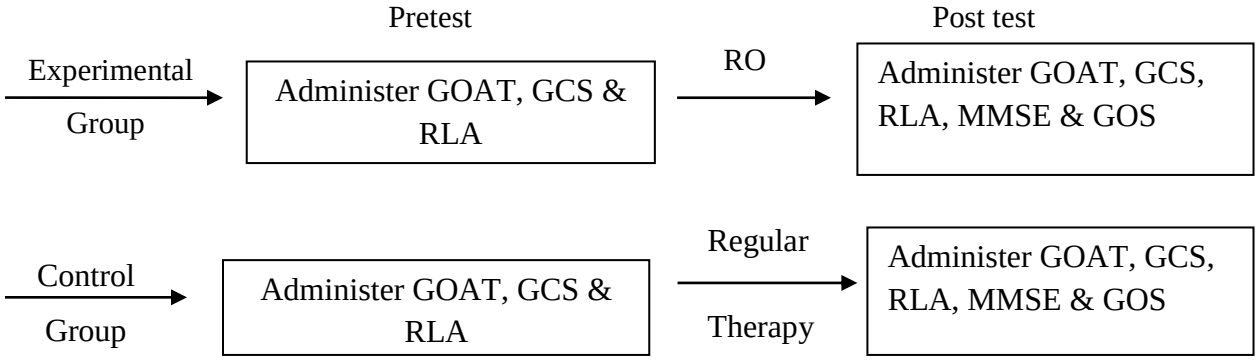
Place of study

The study was conducted in Kovai Medical Center and Hospital, Coimbatore and at the home of the participants.

Research Design

Pre and post intervention design was adopted for the study.

Schematic Representation of the study design



Variables

Independent variables

Intervention with ROP for TBI patients

Dependent variables

1. Duration of PTA (GOAT)
2. Cognitive skills (MMSE)
3. Recovery after TBI (GCS, RLA & GOS)

Sampling

Convenient sampling.

Sample Size

20 TBI patients who were equally divided in Experimental Group (N=10) and Control Group (N=10). Convenient sampling of TBI patients were done based on inclusion criteria.

Inclusion Criteria

1. A score of less than 76 on the Galveston Orientation and Amnesia Test.
2. Rancho Los Amigos stages 4.
3. GCS – 12 and above.
4. Subjects with a clear history of Traumatic Brain Injury.
5. Traumatic Brain Injury patients within a duration of 1 month.
6. Age 15 to 75.
7. Should speak and read either English or Tamil

Exclusion Criteria

1. No known pre-morbid diagnosed dementia.
2. Patients having any other psychiatric disorders like Schizophrenia etc.
3. Patients having any other neurological problems like Multiple Sclerosis etc
4. Severe visual and hearing impaired clients are excluded

Tool Used

Screening Tools

1. Galveston Orientation and Amnesia Test (GOAT)
2. Glasgow Coma Scale (GCS)
3. Rancho Los Amigos Scale (RLA)

Outcome Measure Tools

1. Galveston Orientation and Amnesia Test (GOAT)
2. Mini Mental Status Examination (MMSE) (Outcome Predictor)
3. Glasgow Coma Scale (GCS)
4. Rancho Los Amigos Scale (RLA)
5. Glasgow Outcome Score(GOS)

Galveston Orientation and Amnesia Test (GOAT)

This instrument was developed to establish the duration of PTA after TBI. Evaluation was done in a repeated manner to identify whether the patient is terminated out of amnesia. It is composed of 10 questions that administers the orientation and amnesia. GOAT includes questions regarding the patients name, address, identification of location, date of admission in hospital, events that happened before and after the injury. Information was confirmed with family members. It is scored by the formula 100 – total error. GOAT has an Inter-observer Reliability of τ=0.99 ($p<0.001$) and 0.99 for individual items (Levin et al. 1979). The Internal Consistency based on Rasch analysis, person separation reliability=2.46 and item separation reliability=8.68 and all items adhered to a single construct (Bode et al. 2000). A Construct Validity on Rasch analysis, the constructed item hierarchy confirmed previous research-orientation to person, place and time precedes aspects dealing with memories surrounding the injury (Bode et al. 2000). GOAT scores correlated positively with GCS scores ($r=0.456$; $p<0.002$) and with admission and discharge FIM scores (r=0.701 and 0.531, respectively) (Novack et al. 2000). For Concurrent Validity the scores on GOAT and JFC PTA scale reported to be strongly correlated ($r=0.99$; $p<0.000$) (Forrester et al. 1994) and GOAT scores correlated with Orientation Log scores ($r=0.901$; $p<0.001$) (Novack et al. 2000)

GOS

They indicated that baseline GOS score was a reliable predictor of outcome in patients with an initial score of 5 (no disability) or 4 (mild disability), but not in patients with an initial score of 3 (severe disability) (Miller K et al, 2005). There is five outcome categories : 1) death, 2) persistent vegetative state, 3) severe disability, 4) moderate disability and 5) good recovery. (Jennett & Bond 1975) The criterion validity of GOS when correlated with GCS reveals adequate correlation (assessed 6 months later) (Balestreri et al, 2004) and construct validity of GOS while correlating with GCS shows adequate correlation, (GOS) r= 0.557 (Amirjamshidi et al, 2006)

MMSE

MMSE is used extensively as a brief screening tool, there are literature which had used it for predicting outcome too. (De Guise. E., et al, 2013; H. W. Kim., et al, 1998) De Guise E., et al had concluded that Montreal Cognitive Assessment was not a better predictor of outcome than the MMSE for a TBI population in the acute care setting. It consist of 11questions incorporated into 7 cognitive domains such as orientation to time, orientation to place, registration of three words, attention and calculation, recall of three words, language and visual construction. It has a maximum score of 30 scored based on the observation of items. Construct Validity showed excellent correlation with Wechsler Adult Intelligence Scale verbal IQ(r= 0.78) (Folstein et al, 1975), poor to adequate predictive validity of MMSE and FIM correlations (Ozdemir et al, 2001)

GCS

It assesses the level of consciousness after the TBI to monitor the changes in the client. It has three domains, eye with maximum score of 4, verbal with maximum score of 5 and motor with a maximum score of 6. GCS has adequate inter- rater agreement= 71% (Fischer et al, 2010), construct validity has adequate correlation between whole brain

apparent diffusion coefficient histogram values and GCS score (*r* squared =.67) (Shanmuganathan et al, 2004)

RLA

This tool was developed to evaluate the patterns of recovery after brain injury. Scale describes the cognitive and behavioural characteristics. RLA has eight levels from level 1(no response) to level 8(purposeful and appropriate). Inter- rater Reliability was excellent (average Spearman rho=.89) (Gouvier et al, 1987). Admission and discharge LCFS scores predicted 86.8% of patients who returned to work and 63.2 % of those who did not (Rao and Kilgore, 1992). Excellent concurrent validity of LCFS with Stover-Zeiger scale was *r* =.92 at admission. (Gouvier et al, 1987)

Procedure

First an ethical clearance was obtained from Institutional Review Board. Participants were selected based on the above mentioned inclusion criteria and were divided equally into the experimental (N=10) and control group (N=10). Following which control group underwent regular therapy which was based on therapist orienting them to time, place and person through auditory inputs alone and was done at least for 30 minutes per session. And a standardized protocol of ROP was used which used both auditory and visual inputs as treatment modality for participant's selected under experimental group. Both the groups received therapy for one month (2 weeks in hospital and 2 weeks in hospital/home by family members) twice a day. The patient was encouraged and reinforced for each correct response by verbally saying 'excellent' or 'good' or by a pat at the back. This enabled him to develop interest. The therapist allows the family members to observe and was supervised by the primary researcher while the family members are providing orientation and corrected which will enable them to provide therapy in their home. The board was removed from foot end of the bed while assessing for orientation. The GOAT instrument was evaluated every day, when patient was discharged from hospital they were evaluated through phone. Other tools were evaluated on the first day, second day,

end of 1st week, end of 2nd week and end of 4th week while patient came for doctor's follow-up.

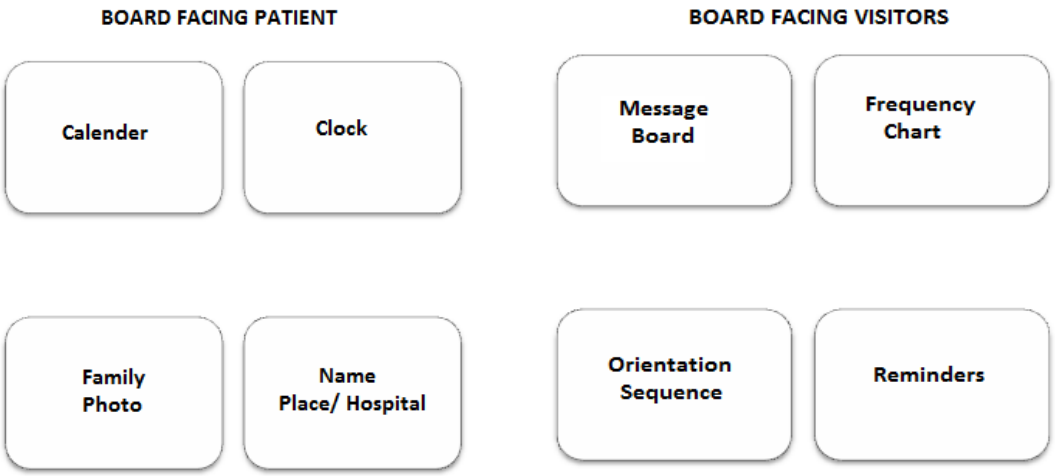
Protocol

An orientation board was developed to bring in an orienting environment and to enable the family members to pursue the standardized protocol without any confusion. Orientation footboard includes orientation sequence, family task sheet and the frequency chart which was especially developed for ROP.

Patient-oriented materials required

The 2 feet x 2 feet footboard slips into the 'S' bend shaped rod that can be easily fixed into the foot end of the hospital bed and each of its two sides have four spaces for presenting information. The side of the footboard that faces the patient has a clock and a letter-sized sheet of paper with the month's calendar printed on it, both in the upper half. The bottom half has two clear letter-sized paper with the name of the hospital in one and the name of the patient, along with space for family photos, in the other.

The side of the footboard that faces the visitors includes Message Board and letter-sized sheet of paper called the Frequency Chart which monitored the frequency in which the patient received orientation. These were present in the upper half of the board. Bottom half consisted of Orientation Sequence for them to use each time they visited, and Important Reminders concerning the needs of the patient was in the other.



Visitor-oriented materials

The Family Tasks Sheet was given to the family members to bring items such as family photos, toiletries, and mementos with special meaning for the patient. The family members were encouraged to bring them as it will assist in stimulating reorientation. Items such as Reminders were also included on the card regarding visiting periods of 20 minutes followed by rest period of 30 minutes without visitors, limited visitors of 2 at a time, the orientation information to provide to the patient, and how best to speak to him or her.

The therapist orients the patient when they first approach him or her and whenever appropriate during the day by reading aloud the Orientation Sequence Chart on the wall over the headboard of the patient's bed. The orientation sequence includes the patient's name, the visitor's name and relationship to the patient, the name of the hospital and the reason why the patient is in hospital, the weekday, date, month, and year, the hour and time period of the day (morning, afternoon, evening, night), the reason why the visitor has come (to visit, to do an activity, to do a test).

Whoever orients the patient early in the morning marks off the previous day on the calendar. Each time orientation takes place the visitor is asked to mark the Frequency Chart. Each TBI patients should receive a minimum of two standardized orientations per day. The chart lists the 7 days of the week and four time periods of the day in a table with boxes initialed, N-nurse, A-attendant, F-family/friend and T-TBI team member. The nurses were requested to orient the patients completely out of their own interest as all of them had their daily chores to accomplish. The chart which is present in the footboard was circled each time the orientation sequence was stated to the patient.

Figure 1: Reality Orientation Program in Hospital

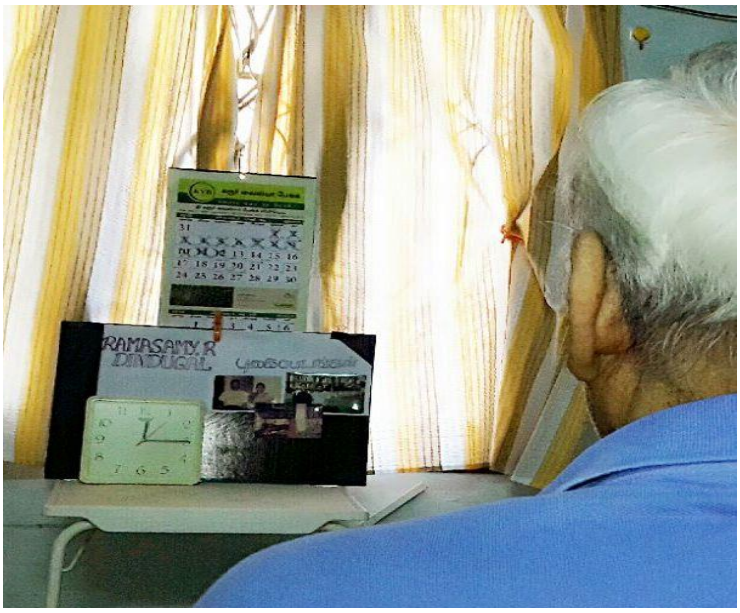


Figure 2: Reality Orientation Program in Home

DATA ANALYSIS AND RESULTS

Data was analyzed using SPSS version 20. Assumption was evaluated by tests of normality for all variables. Non parametric were chosen because the variables were not within the normal distribution. To evaluate the group differences Mann Whitney was used for between group comparison, Wilcoxon was used for within the group comparison, Spearman rank correlation was used for the correlation between age, GCS and PTA, GCS and GOAT. Repeated measure ANOVA was used for assessing their effect size.

RESULTS

Table 1: Characteristics of participants

	Group	N	Mean	SD	p value
Age	Experimental Group	10	39.1	13.9	.140
	Control Group	10	50.7	17.1	
Interval	Experimental Group	10	13.1	9.38	.622
	Control Group	10	15.6	10.2	
GCS	Experimental Group	10	13.1	0.57	.125
	Control Group	10	13.5	0.53	
RLA	Both Group	20	4	.000	
Gender	Group	Female		Male	
	Experimental Group	3		7	
	Control Group	5		5	

The table shows that there is no significant difference observed between the group in Age, Interval which is number of days between the day of injury to the first day of evaluation, GCS, RLA and Gender.

Table 2: Outcome Measures for experimental group and control group

	Group	N	Mean	SD	p value
PTA	Experimental Group	7	30	12.7	.096
	Control Group	7	39.9	10.9	
GOS	Experimental Group	10	4.7	0.48	.081
	Control Group	10	4.3	0.48	

There was no statistical difference between the groups in the duration of PTA and Outcome measure GOS.

Table 3: Correlation between Age, GCS and PTA

		GCS	PTA
Age	Correlation Coefficient	.234	.242
	Sig. (2-tailed)	.321	.304
	N	20	20

There was no positive correlation between age and PTA & age and GCS

Table 4: Correlation between Initial GCS and PTA

		PTA
Initial GCS	Correlation Coefficient	.050
	Sig. (2-tailed)	.865
	N	14

Above table showed no correlation between GCS and PTA

Graph 1: Correlation between Initial GCS and PTA

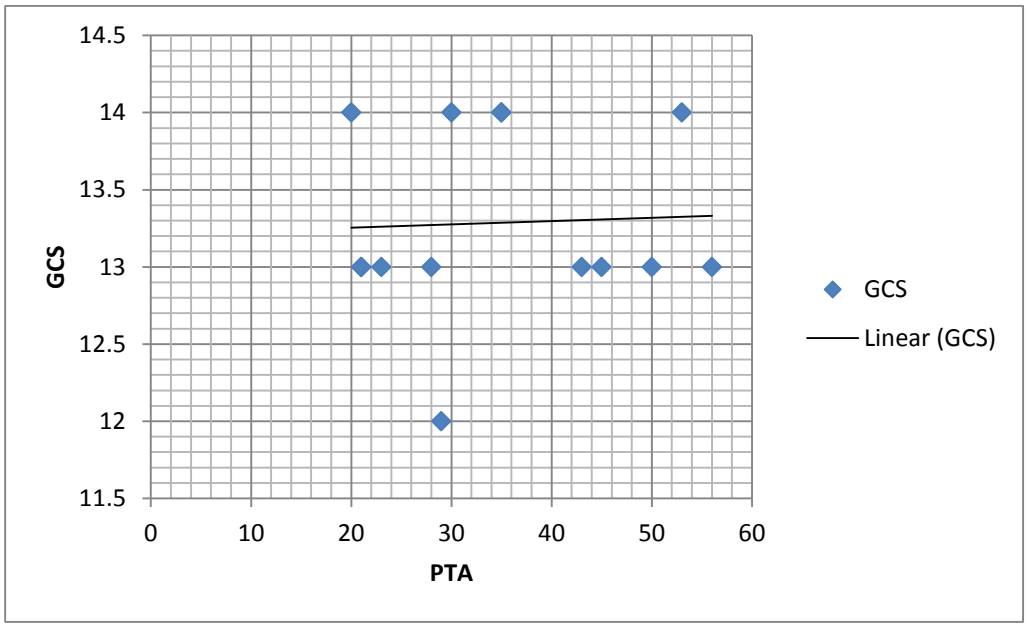


Table 5: Comparison of MMSE scores at various timeline (between group analysis)

	Group	N	Mean	SD	Mann-Whitney U	p value
MMSE 1st day	Experimental Group Control Group	10 10	2.1 2.9	2.18 2.37	33.0	.175
MMSE end of 1st week	Experimental Group Control Group	10 10	13.3 10.8	5.37 6.61	38	.363
MMSE end of 2nd week	Experimental Group Control Group	10 10	22.2 18.2	4.89 5.69	31	.150
MMSE end of 4th week	Experimental Group Control Group	10 10	26.8 22.7	3.48 4.29	22.5	.037*

The above table shows no significant difference except at the end of 4th week of MMSE.

Table 6: Comparison of GCS scores at various timeline (between group analysis)

	Group	N	Mean	SD	Mann-Whitney U	p value
GCS 1st day	Experimental Group	10	13.1	.57	32.5	.125
	Control Group	10	13.5	.53		
GCS end of 1st week	Experimental Group	10	13.8	.42	45	.615
	Control Group	10	13.7	.48		
GCS end of 2nd week	Experimental Group	10	14.1	.57	45.5	.654
	Control Group	10	14.0	.47		
GCS end of 4th week	Experimental Group	10	14.7	.48	40	.374
	Control Group	10	14.5	.52		

The above table shows no statistical significance on comparison of GCS between the experimental and control group

Table 7: Comparison of RLA scores at various timeline (between group analysis)

	Group	N	Mean	SD	Mann-Whitney U	P value
RLA 1st day	Experimental Group	10	4.0	.000		
	Control Group	10	4.0	.000	50	1.000
RLA end of 1st Week	Experimental Group	10	4.7	.674		
	Control Group	10	4.6	.699	45.5	.707
RLA end of 2nd Week	Experimental Group	10	6.0	1.15		
	Control Group	10	5.6	.516	44	.615
RLA end of 4th Week	Experimental Group	10	7.7	.674		
	Control Group	10	7.3	.823	35.5	.195

On comparison of RLA between the groups, it showed no statistical significance.

Table 8: Comparison of GOAT scores at various timeline (between group analysis)

	Group	N	Mean	SD	Mann-Whitney U	p value
GOAT 1st day	Experimental Group	10	7.2	16.2		
	Control Group	10	2.0	8.2	50	1.000
GOAT end of 1st week	Experimental Group	10	44.6	25.1		
	Control Group	10	37.5	19.3	39	.405
GOAT end of 2nd week	Experimental Group	10	69.5	14.5		
	Control Group	10	61.2	15.1	32	.173
GOAT end of 4th week	Experimental Group	10	80.5	7.8		
	Control Group	10	75.0	11.8	36	.288

On comparison of GOAT between the groups it showed non significance.

Table 9: Comparison within pre and post test results of experimental group- Wilcoxon

Scales	Test	N	Mean	SD	Z score	p value
MMSE	Pretest	10	2.1	2.18	-2.812	.005***
	Post test	10	26.8	3.48		
GCS	Pretest	10	13.1	0.56	-2.859	.004***
	Post test	10	14.7	0.48		
RLA	Pretest	10	4.0	0.00	-2.970	.003***
	Post test	10	7.7	0.67		
GOAT	Pretest	10	7.2	16.23	-2.805	.005***
	Post test	10	80.5	7.84		

The pre and post test scores within the experimental group on the following scales such as MMSE, GCS, RLA and GOAT showed high statistical significance

Table 10: Comparison within the pre and post test results of control group

Scales	Test	n	Mean	SD	Z score	p value
MMSE	Pretest	10	2.9	2.37	-2.809	.005***
	Post test	10	22.7	4.29		
GCS	Pretest	10	13.5	0.52	-2.428	.015**
	Post test	10	14.5	0.52		
RLA	Pretest	10	4.0	0.00	-2.850	.004***
	Post test	10	7.3	0.82		
GOAT	Pretest	10	2.0	8.15	-2.805	.005***
	Post test	10	75.0	11.7		

The comparison within the control group of pre test and post test showed high significance

Table 11: To examine the effect size of MMSE of both the groups

MMSE	df	F	p value	Partial eta squared
Between Group	1	1.4	.258	.070
Error	18			

For between the experimental and control group 5 (timeline/session) by 2 (group) repeated measure ANOVA using MMSE scores indicated that the experimental group of patients with TBI did not perform significantly better than the control group over the five timeline, F(1,18)=1.4,p=.258, ηp2=.070(medium effect)

Graph 2: To examine the effect size of MMSE of both the groups

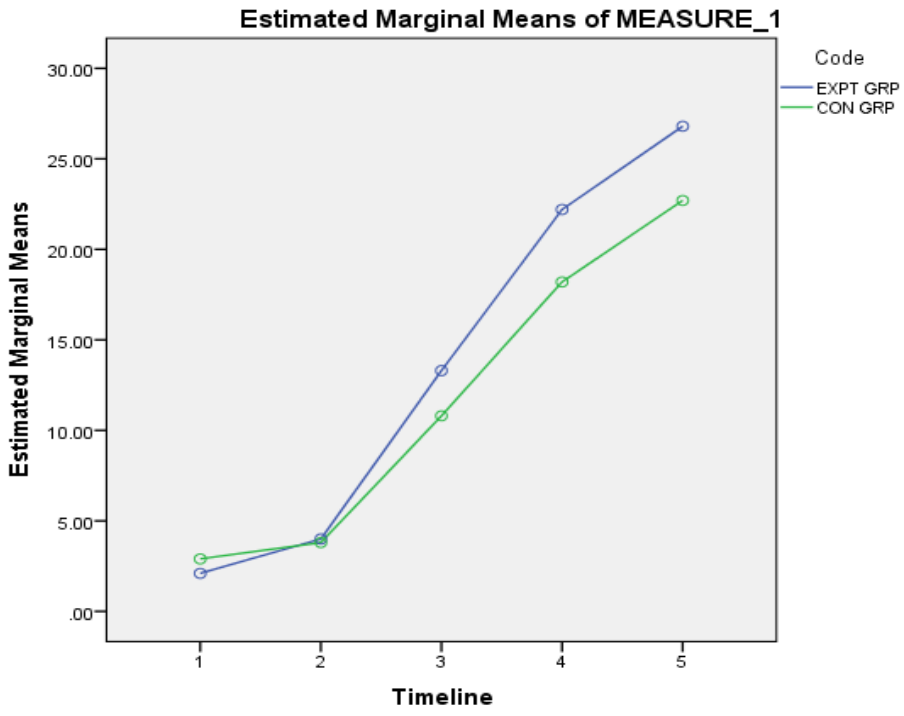


Table 12: To examine the effect size of GCS of both the groups

GCS	df	F	p value	Partial eta squared
Between Group	1	.000	1.000	.000
Error	18			

For between the experimental and control group 5 (timeline/session) by 2 (group) repeated measure ANOVA for GCS scores indicated that the experimental group of patients with TBI did not perform significantly better than the control group over the five timeline, F(.000,18)=1, p=1.000, ηp2=.000(very low effect)

Graph 3: To examine the effect size of GCS of both the groups

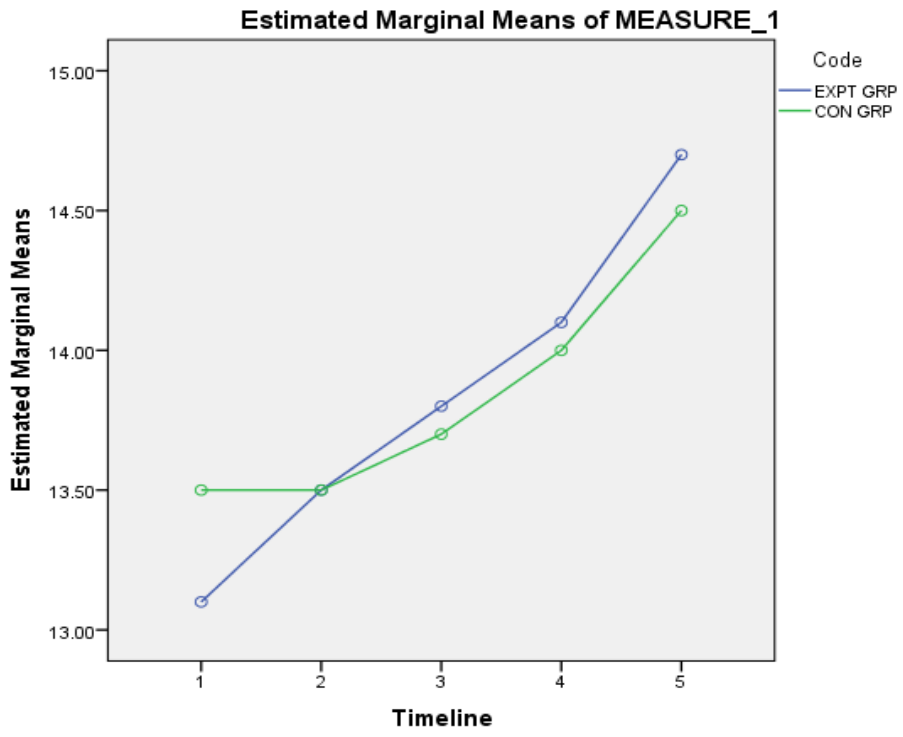


Table 13: To examine the effect size of RLA of both the groups

RLA	df	F	p value	Partial eta squared
Between Group	1	.924	.349	.049
Error	18			

For between the experimental and control group 5 (timeline/session) by 2 (group) repeated measure ANOVA for RLA scores indicated that the experimental group did not perform significantly better than the control group over the five timeline, F(1,18)=0.924, p=.349, ηp2=.049 (small effect)

Graph 4: To examine the effect size of RLA of both the groups.

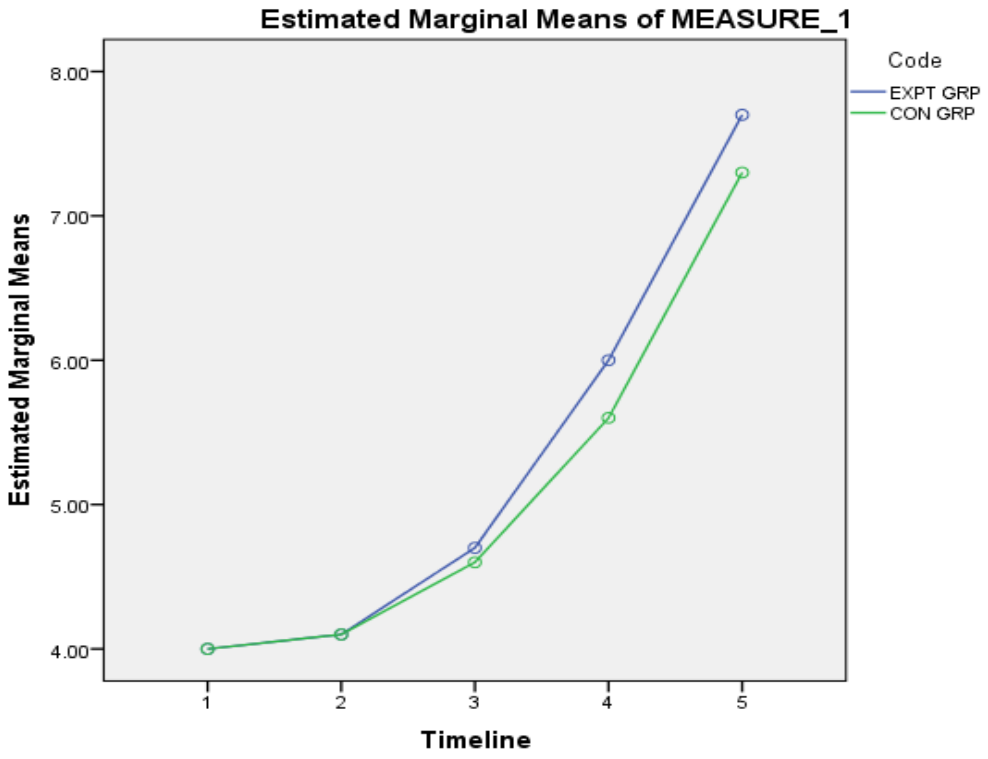


Table 14: To examine the effect size of GOAT of both the groups

GOAT	df	F	P value	Partial eta squared
Between Group	1	1.712	.207	.087
Error	18			

For between the experimental and control group 5 (timeline/session) by 2 (group) repeated measure ANOVA for RLA scores indicated that the experimental group did not perform significantly better than the control group over the five timeline, F(1,18)=1.712, p=0.207, ηp2=.087 (medium effect)

Graph 5: To examine the effect size of GOAT of both the groups

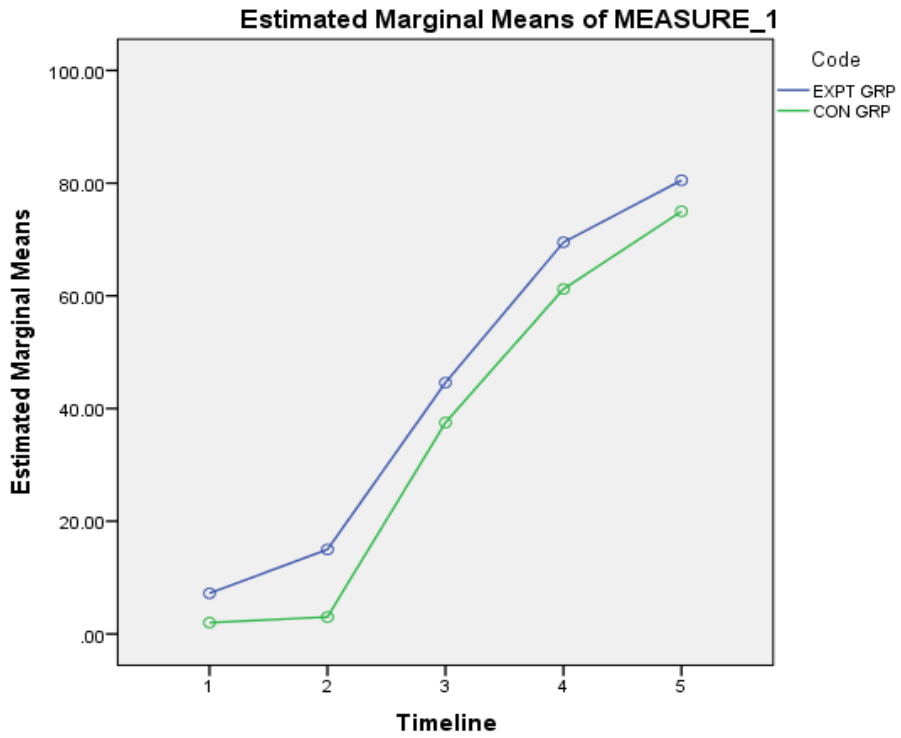
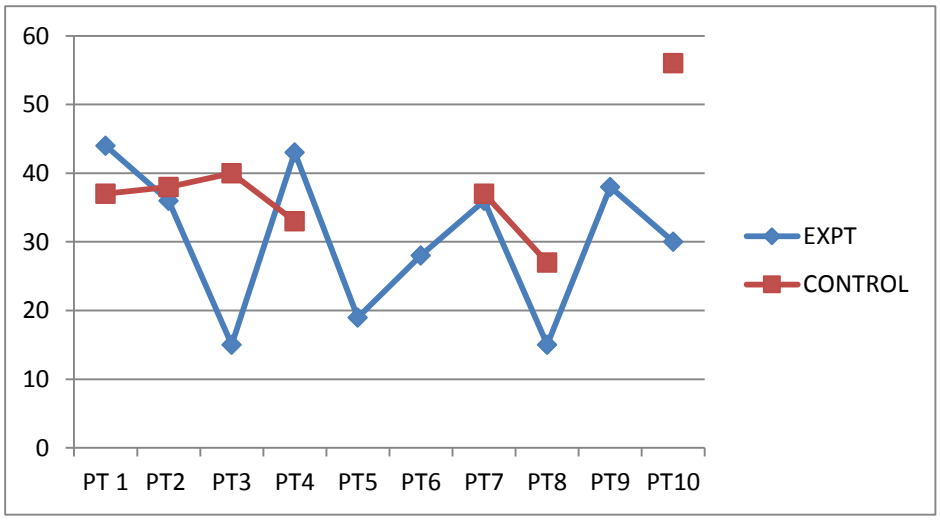


Table 15: Descriptive statistics of time, place and person

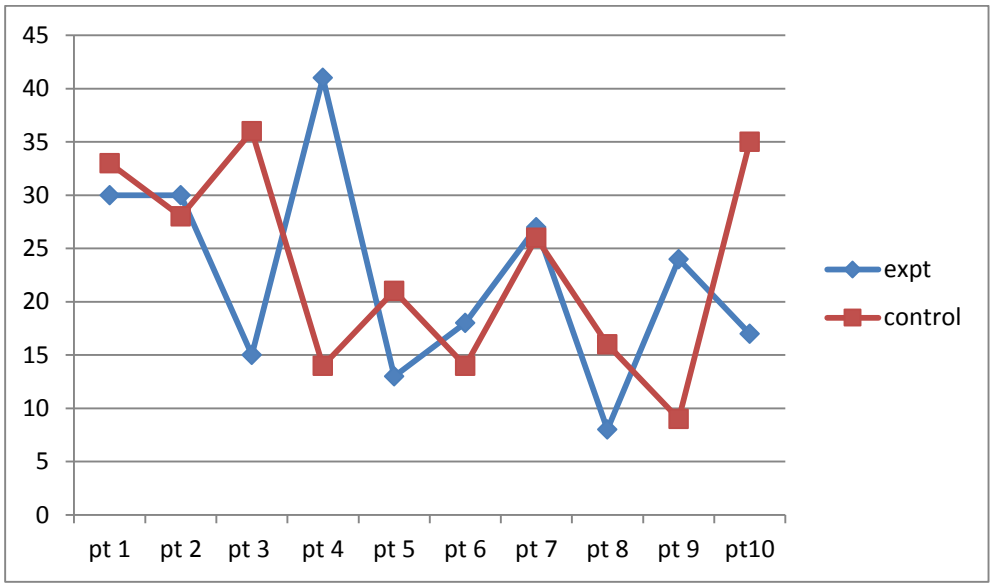
	Group	N	mean	SD	Pvalue
Time	Experimental group	10	30.4	10.9	.221
	Control group	7	38.3	8.9	
Place	Experimental group	10	22.3	9.9	.820
	Control group	10	23.2	9.7	
Person	Experimental group	10	14.1	5.8	.494
	Control group	10	17.1	9.1	

The above table shows that the resolution of time in experimental group had a mean of 30.4 (n- 10), control group had a mean of 38.3 (n-7), resolution of place had a mean of 22.3 of experimental group whereas mean of control group was 23.2, and resolution of person in experimental group was a mean of 14.1 and 17.1 in control group.

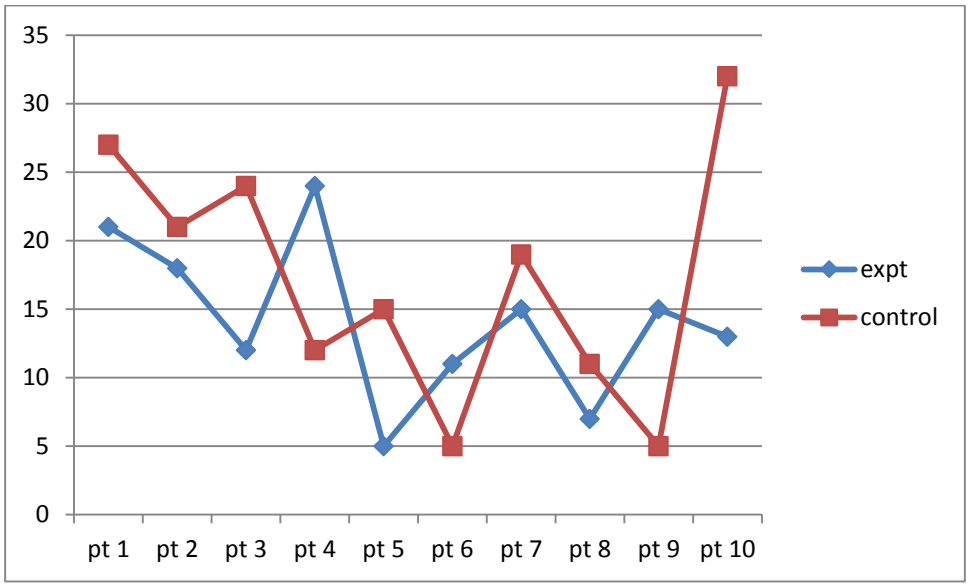
Graph 6: Descriptive statistic of time



Graph 7: Descriptive statistic of place



Graph 8: Descriptive statistic of person



DISCUSSION

This study was conducted in Coimbatore, Kovai Medical Centre and Hospital. The patients were recruited from the hospital with the permission of the doctors and ethical approval. 10 participants were allotted in the control group who received conventional therapy without any standardized protocol of orientation. 10 participants received ROP which is a standardized protocol of orientation. This ROP was brought into light as in Indian scenario where there are lots of patients with TBI entering the hospital, therapist may face confusion as to what therapy has to be given for the patients with PTA. Agitated behavior was often identified as the most difficult for staff as well as the families to cope with. Staff report frustration while providing care to this type of client group (Montgomery, Kitten & Niemiee, 1997) as their behavior can cause a physical risk to themselves and staff members (Reidel & Shaw, 1997). Care givers in India lack awareness of the importance of therapy during this crucial acute period and disagree with the therapist for orientation except when they are physically disabled. The aim of this study was to assess the effectiveness of ROP for patients in stage 4 RLA by involving the family members into the program.

On baseline both the groups were matched in age, interval, GCS, RLA and gender. Mean age were 39.1 years (±13.9) for experimental group and 50.7 years (±17.1) for control group (p=0.113), Interval denotes the number of days between the date of injury to date of first evaluation, mean interval of experimental group was 13.1 days (±9.38)and 15.6 days (±10.2) for control group (p=0.576), GCS mean was 13.1 (±0.57) in experimental group and 13.5 (±0.53) in control group (p=0.120) and stage 4 of RLA in both the group were included. 12 male and 8 females were recruited for the study (Table 1)

According to Lezac's classification of severity of PTA (Bigler, as cited in Lezak, 1995), the patients in the present study had more than 4 weeks of PTA which falls into 'extremely severe' category unlike the previous literature where the clients, were under 'very severe' category (Langhorn L et al, 2015; De Guise E, et al, 2005). Earlier studies

have shown that clients with less than two weeks of PTA duration have a good recovery compared with PTA duration of 4 weeks to 6 weeks, (Alderson & Novack, 2002; Katz & Alexander, 1994), which could be a reason for lack of statistical significance($p > .05$) difference in duration of PTA for both the groups. Duration of PTA for experimental group was reduced for the present study which had a mean of 30 days whereas for control group it was 40 days ($p=0.096$). With regard to hypothesis relating to the effectiveness of ROP on duration of PTA, results exhibit the experimental group resolved from PTA 10 days earlier than the control group. Only 14 patients in both the groups came out of the PTA whereas the remaining 6 didn't evolve from PTA within the time period of the study. The control group emerged out of PTA at the same rate as that of experimental group, this could be due to the fact that most of the patients who get admitted in India are discharged earlier, when they get back to their home they are repeatedly stimulated in a familiar environment and develop orientation faster. (Table 2)

With regard to the effect of ROP on outcome, mean GOS was 4.7 (±0.48) in experimental group and in the control group, mean GOS was 4.3 (±0.48). However, the p value 0.081 demonstrates non significance between control and experimental groups. One possible explanation for the lack of statistical significance could be that GOS lacks the sensitivity to detect small but clinically relevant treatment effects (Weir et al, 2012). (Table 2)

The age could not explain the absence of difference found between the two groups in terms of level of consciousness and duration of PTA. Though most of the studies currently available on ROP relate to the elderly demented patients; our study results cannot be compared to their findings, (Woodrow P, 1998; Spector A, 2000; Jones A, 1993) as the mean age of our patients varied between young and old adult age group. The present study is in contrast to Limpastan K et al who say that, younger age group have higher GCS. Also there was no correlation between age and PTA unlike some studies in literature which suggests that elder age group population tend to have longer PTA (Katz D & Alexander M, 1994; Russel W & Smith A, 1961) (Table 3)

No correlation was observed between Initial GCS and PTA, which indicated that a low GCS score was not related to a longer PTA. Present study was consistent with the prior reports that initial GCS is a poor predictor of long term outcome (Zafonte et al, 1996).(Table 4 & Graph 1)

On comparison of MMSE scores between the group at various timeline statistical significance was found at the end of 4th week which could be due to the short term retest effect as most of the clients in experimental group were terminated out of PTA (Doraiswamy & Kaiser 2000) (Table 5). Regarding to the TBI population, the RO has documented effect on improving memory and thinking behavior, and the method is particularly useful in the first period after the injury (Ahmed et al., 2000; Corrigan et al., 1985; Zencius et al., 1998). Though there was no statistical significance between the groups on GCS and RLA, the mean values revealed that both the groups were improving (Table 6 & 7).

There was no statistical significance on comparing GOAT between the groups may be due the fact that GOAT assessed orientation component more than memory related to anterograde amnesia which is the major characteristic of PTA.(Tate RL et al, 2000) (Table 8) but on comparing from pre to post test scores within the groups there was a significant difference on GOAT scores which reveals that both the ROP and conventional program had helped in improving the orientation as well as memory for the TBI patients. Therefore literature indicates the use of GOAT to identify requiring specialized rehabilitation and when to get discharged from NICU. Further RLA and GOAT can be used as predictors for indicating therapy. Another interesting component was that GOAT assesses for Date of birth which was not known by elderly Indian population. This could be because culturally it wasn't important for them to remember and memory issues related to age could also be a factor. It was also found that both the groups had improved scores on MMSE, GCS and RLA (Table 9 & 10), it showed high significance which

implies that irrespective of the therapy both control and experimental group improved overtime.

On examining the effect size MMSE scores had medium effect (ηp2=.070), GCS had very low effect ηp2=.000, small effect size (ηp2=.049) for RLA, and GOAT revealed medium effect (ηp2=.087) between group. This reveals that ROP was effective in reducing the duration of PTA (GOAT) and improving the cognitive skills (MMSE) of the pts with TBI which indicates that GOAT and MMSE are predictors of ROP. (Table 11-14 & Graph 2- 5)

On analyzing the resolution of disorientation in relation to time, place and person, there was no statistical significance but the mean values showed that the experimental group (Time- 30 days, Place- 22 days and Person- 14 days) achieved these skills earlier than the mean of control group (Time- 38 days , Place- 23 days, Person- 17 days). Previous study timing(Person – 15 days) done by Tate RL et al, where in contrast to our finding of study where orientation to person achieved earlier, which could be attributed to the strong, stable, close bond of Indian family (Mullatti 1995; Shangle 1995).(Table 15 & Graph 6-8)

On getting a verbal feedback from the family members of the patients who were involved in ROP, they found the program enhanced them to be actively involved, integrated into therapy and be aware of how to deal with their loved ones.

Thus the study summarizes that though both the group showed improvement over time, this study finding reveals that PTA duration of ROP group was shorter than that of conventional group. Secondly there was no correlation between age & GCS, age & PTA and PTA & GCS which is in line with the finding of previous studies. There was no statistical significance in the initial week following ROP and conventional therapy but the ROP showed improvement in the end of 4^{th} week. There was no significant difference in GCS, RLA & GOS when compared between the groups. When comparison was done

within the group there was an improvement in all outcome measures post test, revealing that both the groups had benefitted from their intervention. But on comparing the significance of effectiveness it was found that experimental group showed medium effect size in areas of cognition and duration of PTA. The study further indicated that after ROP period, the length of time to obtain correct response on orientation varied from 14 days to 30 days.

Therefore the above study indicates that systematic ROP could have a positive impact on the length of PTA, and improve the orientation and memory skills of the patients with TBI.

CONCLUSION

ROP appears to have positive impact on the Rehabilitation of TBI patients as there was trend of 10 days earlier PTA than the control group even though there was a lack of statistical significance. This ROP might also shape the attitude of therapist towards the patients and also reduces the confusion of what therapy to be given at acute care. This program also has a positive impression on family members as they were aware of how to deal with their loved ones and get involved in their therapy.

LIMITATION AND RECOMMENDATION

1. The study was not blinded to the primary researcher, as the researcher provided intervention as well.
2. The tendency of Indian family members, over protectiveness which hinders participation should have been studied.
3. Assessment of family members involvement through a scale should have been incorporated.
4. Results of this study could not be generalized due to small sample size.

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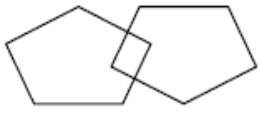
II. MINI MENTAL STATUS EXAMINATION

Maximum Score	Patient's Score	Questions
5		"What is the year? Season? Date? Day of the week? Month?"
5		"Where are we now: State? County? Town/city? Hospital? Floor?"
3		The examiner names three unrelated objects clearly and slowly, then asks the patient to name all three of them. The patient's response is used for scoring. The examiner repeats them until patient learns all of them, if possible. Number of trials: _____
5		"I would like you to count backward from 100 by sevens." (93, 86, 79, 72, 65, …) Stop after five answers. Alternative: "Spell WORLD backwards." (D-L-R-O-W)
3		"Earlier I told you the names of three things. Can you tell me what those were?"
2		Show the patient two simple objects, such as a wristwatch and a pencil, and ask the patient to name them.
1		"Repeat the phrase: 'No ifs, ands, or buts.'"
3		"Take the paper in your right hand, fold it in half, and put it on the floor." (The examiner gives the patient a piece of blank paper.)
1		"Please read this and do what it says." (Written instruction is "Close your eyes.")
1		"Make up and write a sentence about anything." (This sentence must contain a noun and a verb.)
1		"Please copy this picture." (The examiner gives the patient a blank piece of paper and asks him/her to draw the symbol below. All 10 angles must be present and two must intersect.) 
30		TOTAL

(Adapted from Rovner & Folstein, 1987)

III. RANCHO LOS AMIGOS

(1) **Level I** - *No Response.*
Patient does not respond to external stimuli and appears asleep.

(2) **Level II** - *Generalized Response.*
Patient reacts to external stimuli in nonspecific, inconsistent, and nonpurposeful manner with stereotypic and limited responses.

(3) **Level III** - *Localized Response.*
Patient responds specifically and inconsistently with delays to stimuli, but may follow simple commands for motor action.

(4) **Level IV** - *Confused, Agitated Response.*
Patient exhibits bizarre, nonpurposeful, incoherent or inappropriate behaviors, has no short-term recall, attention is short and nonselective.

(5) **Level V** - *Confused, Inappropriate, Nonagitated Response.*
Patient gives random, fragmented, and nonpurposeful responses to complex or unstructured stimuli - Simple commands are followed consistently, memory and selective attention are impaired, and new information is not retained.

(6) **Level VI** - *Confused, Appropriate Response.*
Patient gives context appropriate, goal-directed responses, dependent upon external input for direction. There is carry-over for relearned, but not for new tasks, and recent memory problems persist.

(7) **Level VII** - *Automatic, Appropriate Response.*
Patient behaves appropriately in familiar settings, performs daily routines automatically, and shows carry-over for new learning at lower than normal rates. Patient initiates social interactions, but judgment remains impaired.

(8) **Level VIII** - *Purposeful, Appropriate Response.*
Patient oriented and responds to the environment but abstract reasoning abilities are decreased relative to premorbid levels.

IV. GLASGOW COMA SCALE

Eye Opening Response

- Spontaneous--open with blinking at baseline **4 points**
- To verbal stimuli, command, speech **3 points**
- To pain only (not applied to face) **2 points**
- No response **1 point**

Verbal Response

- Oriented **5 points**
- Confused conversation, but able to answer questions **4 points**
- Inappropriate words **3 points**
- Incomprehensible speech **2 points**
- No response **1 point**

Motor Response

- Obeys commands for movement 6 points
- Purposeful movement to painful stimulus 5 points
- Withdraws in response to pain 4 points
- Flexion in response to pain (decorticate posturing) 3 points
- Extension response in response to pain (decerebrate posturing) 2 points
- No response 1 point

V. GLASGOW OUTCOME SCORE

Original Scale	Abbreviation	Description
death	D	dead
persistent vegetative state	PVS	wakefulness without awareness; absence of speech or evidence of mental function in a patient who appears awake with spontaneous eye opening
severe disability	SD	conscious but dependent; patient requires assistance to perform daily activities and cannot live independently
moderate disability	MD	independent but disabled; patient unable to return to work but otherwise able to independently perform the activities of daily living
good recovery	GR	reintegrated but may have nondisabling sequelae; able to return to work but not necessarily at the same level; may have minor neurological or psychological impairments

VI. FAMILY TASK SHEET IN TAMIL

கெ.எம்.சி.ஹ்ற மூளை காய நிகழ்ச்சி நிரல்

திசை திட்டம்

நோயாளியின் முன்னெற்றதிற்கு குடும்ப உதவி மிகவும் முக்கியமாக உள்ளது

கீழ்கானும் வழிமுறைகளில் நீங்களும் உதவலாம்

<u>தயவுகூர்ந்து நோயாளியிற்கு இவைகளை கொண்டு வரவும்</u>

- நெருங்கிய உறவினர்களோடு / நண்பர்களுடன் / செல்லபிறானிகளுடன் எடுத்துகொள்ளபட்ட 2 / 3 புகைப்படங்கள்; முதற்பெயர் மற்றும் என்ன உறவு என்பதை பின்புறத்தில் குறிப்பிடவும்.
- நோயாளியிற்கு முக்கியதுவம் வாய்ந்த 2 பொருட்கள் (சாவி கொத்து, தொலைபேசி, கண்ணாடி, கை கடிகாரம்)
- அவர் தினமும் உபயோகித்த எதாவது சோப்பு
- முன்பு நடப்பதற்காக உபயோகித்த செருப்பு

<u>ஒவ்வொரு முறையும் நோயாளியை அனுகும்போது</u>

- ஒரு சமயத்தில் இரண்டு பார்வையாளகளை மட்டுமே அனுமதியுங்கள்
- பார்வையாளர்களின் நேரம்; அதிகபட்சமாக 20 நிமிடம்; அதையடுத்து ஒய்வு நேரம்; குறைந்தது 30 நிமிடம்; பார்வையாளர்கள் இல்லாமல்.
- சுருக்கம் மற்றும் எளிமையான வாக்கியங்களில் நோயாளியுடன் பேசவும்;இரட்டை அர்த்தமுள்ளவை வேண்டாம்.
- நோயாளியிடம் கூறவும்; தேதி, நேரம், மருத்துவமனையின் பெயர், இங்கு வந்திருக்கும் காரணம்.

APPENDICES

APPENDICES

I. GALVESTON ORIENTATION AND AMNESIA TEST

Question	Error score	Notes
What is your name?	/ 2	Must give both first name and surname.
When were you born?	/ 4	Must give day, month, and year.
Where do you live?	/ 4	Town is sufficient.
Where are you now?		
(a) City	/ 5	Must give actual town.
(b) Building	/ 5	Usually in hospital or rehab center. Actual name necessary.
When were you admitted to this hospital?	/ 5	Date.
How did you get here?	/ 5	Mode of transport.
What is the first event you can remember after the injury?	/ 5	Any plausible event is sufficient (record answer)
Can you give some detail?	/ 5	Must give relevant detail.
Can you describe the last event you can recall before the accident?	/ 5	Any plausible event is sufficient (record answer)
What time is it now?	/ 5	1 for each half-hour error, etc.
What day of the week is it?	/ 3	1 for each day error, etc.
What day of the month is it? (i.e. the date)	/ 5	1 for each day error, etc.
What is the month?	/ 15	5 for each month error, etc.
What is the year?	/ 30	10 for each year error.
Total Error:		
100 - total error		Can be a negative number.

VII. FAMILY TASK SHEET IN ENGLISH

***Please bring in for the patient*:**

1. **2 or 3 photos** of him or her with significant family members, friends and/or pets; write the first name and relationship on the back of each photo. (Please avoid large group photos)

2. **2 objects** that have particular significance for the patient (ex: baseball cap, stuffed animal, etc.)

3. **any toiletries** that he or she used regularly

4. **walking shoes** that he or she wore previously (for physiotherapy)

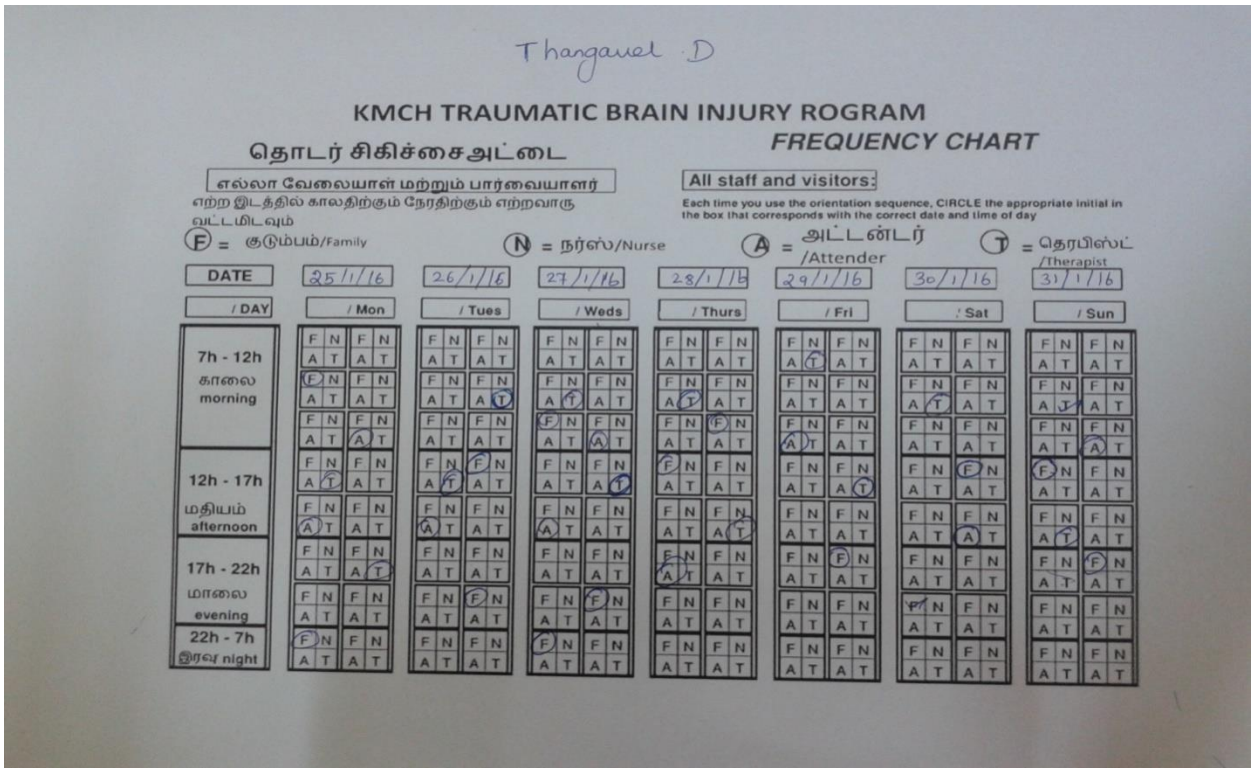
Each time you visit the patient:

1. **limit visitors** to two at a time

2. **visiting period:** maximum 20 minutes—followed by a **rest period:** minimum 30 minutes—without visitors

3. talk to the patient in **short simple sentences;** no double meanings

4. **tell the patient:** the date, the time of day, the name of the hospital, and the reason why he or she is here



Thangavel .D

KMCH TRAUMATIC BRAIN INJURY ROGRAM

தொடர் சிகிச்சைஅட்டை

FREQUENCY CHART

எல்லா வேலையாள் மற்றும் பார்வையாளர்

All staff and visitors:

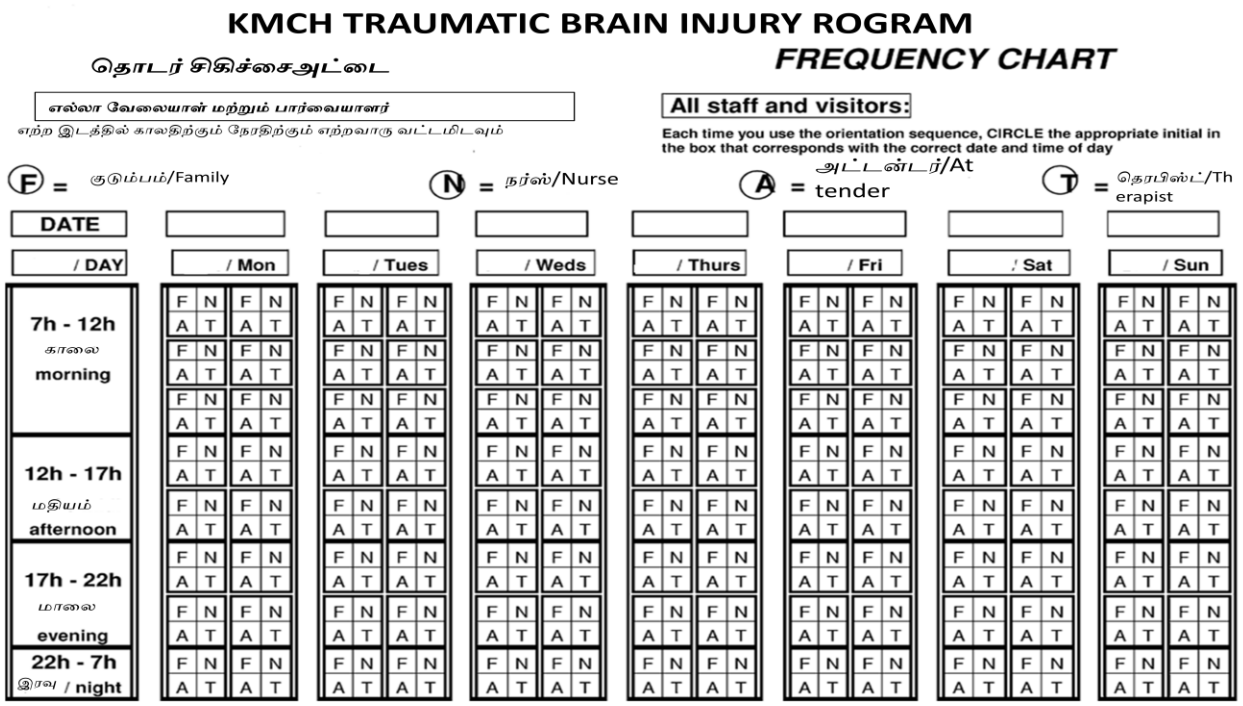
எற்ற இடத்தில் காலதிற்கும் நேரதிற்கும் எற்றவாரு வட்டமிடவும்

Each time you use the orientation sequence, CIRCLE the appropriate initial in the box that corresponds with the correct date and time of day

(F) = குடும்பம்/Family (N) = நர்ஸ்/Nurse (A) = அட்டன்டர் /Attender (T) = தெரபிஸ்ட் /Therapist

DATE		25/1/16	26/1/16	27/1/16	28/1/16	29/1/16	30/1/16	31/1/16
	/ DAY	/ Mon	/ Tues	/ Weds	/ Thurs	/ Fri	/ Sat	/ Sun
7h - 12h	காலை morning	F N A T	F N A T	F N A T	F N A T	F N A T	F N A T	F N A T
12h - 17h	மதியம் afternoon	F N A T	F N A T	F N A T	F N A T	F N A T	F N A T	F N A T
17h - 22h	மாலை evening	F N A T	F N A T	F N A T	F N A T	F N A T	F N A T	F N A T
22h - 7h	இரவு night	F N A T	F N A T	F N A T	F N A T	F N A T	F N A T	F N A T

VIII. FREQUENCY CHART



KMCH TRAUMATIC BRAIN INJURY ROGRAM

தொடர் சிகிச்சைஅட்டை

FREQUENCY CHART

எல்லா வேலையாள் மற்றும் பார்வையாளர்

எற்ற இடத்தில் காலதிற்கும் நேரதிற்கும் எற்றவாரு வட்டமிடவும்

All staff and visitors:

Each time you use the orientation sequence, CIRCLE the appropriate initial in the box that corresponds with the correct date and time of day

F = குடும்பம்/Family N = நர்ஸ்/Nurse A = அட்டன்டர்/Attender T = தெரபிஸ்ட்/Therapist

DATE							
/ DAY	/ Mon	/ Tues	/ Weds	/ Thurs	/ Fri	/ Sat	/ Sun
7h - 12h காலை morning	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T
12h - 17h மதியம் afternoon	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T
17h - 22h மாலை evening	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T
22h - 7h இரவு / night	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T	F N A T F N A T

MASTER CHART

I. MMSE FOR EXPERIMENTAL GROUP

MMSE 1st day	MMSE 2nd day	MMSE END OF 1st WEEK	MMSE END OF 2nd WEEK	MMSE END OF 4th WEEK
.00	1.00	8.00	15.00	24.00
6.00	10.00	22.00	27.00	30.00
3.00	6.00	16.00	27.00	28.00
1.00	3.00	10.00	21.00	29.00
6.00	10.00	22.00	29.00	30.00
1.00	2.00	8.00	22.00	29.00
1.00	2.00	15.00	21.00	24.00
1.00	2.00	12.00	23.00	27.00
1.00	2.00	8.00	14.00	19.00
1.00	2.00	12.00	23.00	28.00

II. MMSE FOR CONTROL GROUP

MMSE 1st day	MMSE 2nd day	MMSE END OF 1st WEEK	MMSE END OF 2nd WEEK	MMSE END OF 4th WEEK
2.00	2.00	14.00	25.00	26.00
1.00	2.00	6.00	16.00	24.00
1.00	1.00	1.00	7.00	17.00
6.00	8.00	15.00	22.00	26.00
1.00	1.00	6.00	17.00	18.00
4.00	5.00	14.00	19.00	20.00
2.00	3.00	10.00	14.00	21.00
2.00	2.00	13.00	23.00	26.00
2.00	3.00	5.00	13.00	19.00
8.00	11.00	24.00	26.00	30.00

III. RLA FOR EXPERIMENTAL GROUP

RLA 1st day	RLA 2nd day	RLA END OF 1st WEEK	RLA END OF 2nd WEEK	RLA END OF 4th WEEK
4.00	4.00	4.00	5.00	7.00
4.00	4.00	5.00	6.00	8.00
4.00	5.00	6.00	8.00	8.00
4.00	4.00	4.00	5.00	8.00
4.00	4.00	5.00	8.00	8.00
4.00	4.00	5.00	6.00	8.00
4.00	4.00	5.00	6.00	8.00
4.00	4.00	5.00	6.00	8.00
4.00	4.00	4.00	5.00	6.00
4.00	4.00	4.00	5.00	8.00

IV. RLA FOR CONTROL GROUP

RLA 1st day	RLA 2nd day	RLA END OF 1st WEEK	RLA END OF 2nd WEEK	RLA END OF 4th WEEK
4.00	4.00	4.00	5.00	8.00
4.00	4.00	5.00	6.00	8.00
4.00	4.00	4.00	5.00	6.00
4.00	4.00	6.00	6.00	8.00
4.00	4.00	4.00	5.00	7.00
4.00	4.00	5.00	6.00	7.00
4.00	5.00	5.00	6.00	7.00
4.00	4.00	4.00	6.00	8.00
4.00	4.00	4.00	5.00	6.00
4.00	4.00	5.00	6.00	8.00

V. GCS FOR EXPERIMENTAL GROUP

GCS 1st day	GCS 2nd day	GCS END OF 1st WEEK	GCS END OF 2nd WEEK	GCS END OF 4th WEEK
13.00	13.00	13.00	13.00	14.00
14.00	14.00	14.00	14.00	15.00
14.00	14.00	14.00	15.00	15.00
13.00	13.00	14.00	14.00	15.00
13.00	14.00	14.00	15.00	15.00
13.00	14.00	14.00	14.00	15.00
13.00	14.00	14.00	14.00	14.00
12.00	13.00	14.00	14.00	15.00
13.00	13.00	14.00	14.00	14.00
13.00	13.00	13.00	14.00	15.00

VI. GCS FOR CONTROL GROUP

GCS 1st day	GCS 2nd day	GCS END OF 1st WEEK	GCS END OF 2nd WEEK	GCS END OF 3rd WEEK
13.00	13.00	14.00	14.00	15.00
14.00	14.00	14.00	14.00	15.00
14.00	14.00	14.00	14.00	14.00
14.00	14.00	14.00	15.00	15.00
13.00	13.00	13.00	14.00	14.00
14.00	14.00	14.00	14.00	14.00
14.00	14.00	14.00	14.00	14.00
13.00	13.00	14.00	14.00	15.00
13.00	13.00	13.00	13.00	14.00
13.00	13.00	13.00	14.00	15.00

VII. GOS FOR EXPERIMENTAL GROUP

GOS 1st day	GOS 2nd day	GOS END OF 1st WEEK	GOS END OF 2nd WEEK	GOS END OF 4th WEEK
3.00	3.00	3.00	3.00	4.00
3.00	3.00	3.00	4.00	5.00
3.00	3.00	4.00	5.00	5.00
3.00	3.00	3.00	4.00	5.00
3.00	3.00	4.00	5.00	5.00
3.00	3.00	3.00	5.00	5.00
3.00	3.00	3.00	4.00	4.00
3.00	3.00	3.00	4.00	5.00
3.00	3.00	3.00	4.00	4.00
3.00	3.00	3.00	4.00	5.00

VIII. GOS FOR CONTROL GROUP

GOS 1st day	GOS 2nd day	GOS END OF 1st WEEK	GOS END OF 2nd WEEK	GOS END OF 4th WEEK
3.00	3.00	3.00	4.00	4.00
3.00	3.00	3.00	4.00	4.00
3.00	3.00	3.00	4.00	4.00
3.00	3.00	4.00	4.00	5.00
3.00	3.00	3.00	4.00	4.00
3.00	3.00	3.00	4.00	4.00
3.00	3.00	3.00	4.00	4.00
3.00	3.00	3.00	4.00	5.00
3.00	3.00	3.00	3.00	4.00
3.00	3.00	3.00	4.00	5.00

IX. GOAT SCORES (EXPERIMENTAL GROUP (1-10) CONTROL GROUP (11-20))

GOAT 1ST DAY	GOAT 2ND DAY	GOAT 3RD DAY	GOAT 4TH DAY	GOAT 5TH DAY	GOAT 6TH DAY	GOAT 7TH DAY	GOAT 8TH DAY	GOAT 9TH DAY	GOAT 10TH DAY
-4	-4	-4	-2	3	4	4	4	14	17
27	35	40	46	50	63	65	71	76	76
-3	42	40	40	55	64	74	74	74	75
3	3	3	13	27	42	43	42	44	44
23	35	22	28	41	61	73	72	71	72
39	50	49	53	59	60	66	64	65	67
1	3	2	13	23	28	30	27	37	54
-2	-2	-2	9	23	36	51	51	52	56
-6	-6	-6	-6	4	20	19	20	19	23
-6	-6	-2	0	5	17	21	21	42	42
-6	-6	-6	4	10	28	48	52	52	52
-6	-6	-6	-1	8	9	21	21	20	27
-1	-1	-2	-2	0	4	6	10	11	31
2	6	1	6	31	51	62	61	61	61
-2	-2	-2	-2	4	16	33	34	35	36
3	3	33	33	37	39	42	45	44	42
1	3	3	3	27	43	49	48	44	50
3	4	3	10	12	13	30	30	31	48
3	3	3	5	4	17	17	15	14	21
23	26	27	32	43	53	64	63	64	64

GOAT 11ST DAY	GOAT 12ND DAY	GOAT 13RD DAY	GOAT 14TH DAY	GOAT 15TH DAY	GOAT 16TH DAY	GOAT 17TH DAY	GOAT 18TH DAY	GOAT 19TH DAY	GOAT 20TH DAY
14	24	28	54	43	43	54	58	59	59
76	82	84	83	83	84	89	90	90	90
80	85	90	90	90	90	90	90	90	90
49	52	57	56	59	59	62	66	65	65
73	74	78	85	85	85	85	85	85	85
66	72	72	72	72	73	74	72	73	74
52	65	70	70	71	71	72	71	72	72
53	61	73	72	72	77	78	78	82	81
30	41	45	45	42	46	56	56	42	56
61	60	68	60	66	68	74	77	78	77
53	60	66	66	72	73	73	73	73	73
36	49	68	67	66	66	65	66	69	67
33	34	36	35	35	34	36	37	41	41
61	67	72	68	73	72	71	73	72	72
41	51	63	70	62	67	67	68	69	71
45	49	55	64	62	61	60	61	55	67
54	61	63	67	62	62	67	68	66	69
50	72	71	73	70	72	78	77	77	78
20	26	31	32	30	32	30	32	63	55
64	69	73	71	73	74	75	75	75	75

GOAT 21ST DAY	GOAT 22ND DAY	GOAT 23RD DAY	GOAT 24TH DAY	GOAT 25TH DAY	GOAT 26TH DAY	GOAT 27TH DAY	GOAT 28TH DAY	GOAT 29TH DAY	GOAT 30TH DAY
61	65	63	71	71	71	71	72	72	72
90	90	90	90	90	90	90	90	90	90
90	90	90	90	90	90	90	90	90	90
65	66	72	73	79	80	80	80	80	80
85	85	85	85	85	85	85	85	85	85
75	85	85	85	85	85	85	85	85	85
74	75	75	75	75	75	75	75	75	75
82	83	84	82	83	84	83	82	82	82
67	69	68	67	66	68	67	66	66	66
84	82	84	82	84	83	82	83	83	83
85	85	85	85	90	90	90	90	90	90
68	69	70	70	68	69	70	78	78	78
52	47	52	63	64	64	65	64	64	64
77	76	78	78	79	80	80	80	80	80
67	70	69	66	69	69	71	73	72	72
66	68	65	63	70	75	75	75	75	75
68	71	69	69	73	72	72	74	73	73
79	84	83	81	83	82	83	84	83	84
58	30	52	52	54	42	56	38	49	49
80	80	80	80	85	85	85	85	85	85