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Manuscript title: Duration in initiation of treatment by health care professionals to patient admitting in selected hospital of Kamrup (M), Assam: An observational study

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Abstract
The timing of ICU admission is associated with mortality outcome for critically ill patient, and delayed ICU admission has been related to increased death for critically ill patient who requires close monitoring and intensive treatment. Early or delay in initiation of treatment to stroke and head injury patient may have an impact on the health status of the patient. So, the study was conducted to assess the duration in initiation of treatment by the health care professionals to stroke and head injury patient admitting in emergency and ICU. The objective of the study is to assess the duration in initiation of treatment by the staff nurses and Doctors to patient admitting in emergency department and ICU of selected hospital of Kamrup (M), Assam. Hence a descriptive research design was used to assess the duration in initiation of treatment by the health care professionals to stroke and head injury patient admitting in emergency and ICU with the objective of assessing the duration in initiation of treatment by the staff nurses and Doctors to patient admitting in emergency department and ICU of selected hospital of Kamrup (M), Assam. Sample size for the study was on 78 health care professionals in which 26 were staff nurses and 52 were doctors working in emergency department and ICU of selected hospitals Convenience sampling technique was used for obtaining the adequate sample for the study. Respondents were selected on the basis of inclusion and exclusion criteria. The duration of initiation of treatment were checked by using observation checklist. The result shows that in the analysis of duration in initiation of treatment by the staff nurses and doctors, the investigator found that the minimum time taken for brief history collection was 4mins 18secs and the maximum time was 9mins 12secs. The minimum time for performing physical examination was 4mins 32secs and maximum time was 6mins 43 secs. For initiation of medication, the minimum time taken was 13mins 16secs and the maximum time was 14mins 2secs. The minimum time taken for initial visit by the doctors was 2mins 17secs and maximum time was 55mins 55secs. Hence the study concluded that early initiation of treatment to stroke and head injury patient may improve the patient outcome and also the quality of care of the organisation whereas delay in initiation of treatment may deteriorates the condition of the patient and also increase the hospital mortality rate.

Keywords: Duration, health care, Kamrup, observational

Introduction
Stroke is a clinical term for acute loss of perfusion in vascular territory of the brain, resulting in ischemia and corresponding loss of neurological functions. A stroke occurs due to ruptured cerebral artery or occlusion by thrombus or embolus of any kind. It is important to recognize when patients with stroke need more specialized monitoring or care than can be delivered on a regular hospital ward. Admission to an intensive care unit (ICU) is usually mandated for patients with progressing neurologic deficits and for any patient who requires intubation, invasive hemodynamic monitoring, or treatment for elevated intracranial pressure.
Head injuries are one of the most common causes of disability and death in adults. The injury can be as mild as a bump, bruise (contusion), or cut on the head, or can be moderate to severe in nature due to a concussion, deep cut or open wound, fractured skull bone(s), or from internal bleeding and damage to the brain.

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In general, TBI is divided into two discrete periods: primary and secondary brain injury.

Intensive care units cater to patients with severe or life-threatening illnesses and injuries, which require constant care, close supervision from life support equipment and medication in order to ensure normal bodily functions. They are staffed by highly trained physicians, nurses and respiratory therapists who specialize in caring for critically ill patients. ICUs are also distinguished from general hospital wards by a higher staff-to-patient ratio and to access to advanced medical resources and equipment that is not routinely available elsewhere. Patients can become critically ill at any time of the day. Ideally, critical care services should be organized to ensure optimal treatment availability to all patients on a 24hour basis. hours and night time hours. In practice, however, the availability and quality of personnel and technology are often different between daytime. The initial treatment is critical and outcomes after intensive care admission partially depend on the time of patient admission.

The timing of ICU admission is associated with mortality outcome for critically ill patient, and delayed ICU admission has been related to increased death for critically ill patient who requires close monitoring and intensive treatment. In a mixed ICU cohort, patients who stayed in the emergency department for>5hrs before ICU admission were 2.5 times more likely to die than those who stayed <5hrs [8]. ICU survivorship has become a top concern and methods to optimize patient recovery and outcomes are important objectives for the health provider, families, and researchers.

Need of the study
Stroke remains the third leading cause of death and the leading cause of long-term disability despite advances in prevention, diagnosis, treatment and rehabilitation. Social and economic consequences of stroke are burden to patients, society in terms of premature death, long-term disability, restrictions in social functions, the cost of care and loss of productivity. Developments in the last decade in the field of acute stroke care have emphasized the critical role of emergency medical services in optimizing the care for stroke patients.

Each year, India produces approximately 1.5–1.7 million individuals who are neurologically disabled due to TBI. The primary injury in the brain can give rise to severe disability due to neuronal destruction. Further deterioration results due to cerebral ischemia from brain swelling, hematoma formation, hypoxia, and hypotension and then leads to secondary brain injury.

Nurses are the health professionals who see the full impact of TBI and have the skills that can alter the course of a patient's recovery; it is important for nurses to have a valuable resource with evidence‑ based recommendations on nursing activities to help them achieve the best possible outcomes. Nurses require knowledge and skills to provide quality care to the adults with STBI. Nurses play a vital role in the management of patients with STBI. Implementation of proper nursing interventions can have the potential to reduce morbidity and mortality and improve quality of life, at least for some conditions and can also improve the consistency of care.

Initial management in the emergency room starts with recognizing TBI and involves assessment of the level of consciousness of the patient, securing the airway with an endotracheal tube for patients with Glasgow Coma Scale (GCS) score of ≤8, ensuring adequate oxygenation (PaO2>60 mmHg) and BP (systolic BP >90 mmHg), inserting peripheral intravenous (I.V) cannulas, cardiac monitoring, pulse oximetry, and continuous waveform capnography if needed. A neurologic examination should be done as soon as possible [11].

Patients newly admitted into the Intensive Care Unit will have care transferred from the transporting team to the ICU staff using clear communication and assessment of the patient to ensure all relevant information, technology and patient safety issues have been addressed. Some ICU patients may need emergency treatments that must be established immediately on admission.

Conceptual framework
The framework of the study is based on the Donabedian model (1980). The Avedis Donabedian model is a conceptual model that provides a framework for examining health services and evaluating quality of health care. Donabedian identified the three dimensions that can be utilized to assess quality of care i.e. structure, process, and outcome.

Dimensions of care
The model is most often represented by a chain of three dimensions containing structure, process, and outcome connected by unidirectional arrows in that order.

Structure
Structure includes all of the factors that affect the context in which care is delivered. This includes the physical facility, equipment, and human resources, as well as organizational characteristics such as staff training and payment methods. These factors control how providers and patients in a healthcare system act and are measures of the average quality of care within a facility or system.

In the study, structure includes the following aspect
1. Physical facility of the ICU and emergency department
2. Equipment: Presence of articles or equipment"s which are needed for the initial treatment for the patient by the health care professionals which will directly hamper the duration of treatment.
3. Human resources refers to the health care professionals i.e. Doctors and staff nurses working in emergency department and ICU.

Process
Process is the sum of all actions that make up healthcare. These commonly include diagnosis, treatment, preventive care, and patient education but may be expanded to include actions taken by the patients or their families. Processes can be further classified as technical processes, how care is delivered, or interpersonal processes, which all encompass the manner in which care is delivered.

In the study, Process signifies the initiation of treatment by health care professionals from the time the patients arrived in the emergency department, till the initial treatment of the same patient after transferring directly to the ICU. The initiation of treatment includes brief history collection, physical examination, medication, investigation and initial visit by the doctors.

Outcome

Outcome contains all the effects of healthcare on patients or populations, including changes to health status, behaviour, or knowledge as well as patient satisfaction and health-related quality of life. Outcomes are sometimes seen as the most important indicators of quality because improving patient health status is the primary goal of healthcare.

In the study, outcome refers to the time taken in initiation of treatment by health care professionals which will directly have an impact on the health status of the patient. The outcome may be either early or delayed. Early initiation of treatment may improve the health status of the patient whereas delayed treatment may deteriorate the health status of the patient.

Problem statement

"Duration in initiation of treatment by health care professionals to patient admitting in selected hospital of Kamrup (M), Assam: an observational study."

Objectives of the study

1. To assess the duration in initiation of treatment by the staff nurses to patient admitting in emergency department and ICU of selected hospital of Kamrup (M), Assam.
2. To assess the duration in initiation of treatment by the Doctors to patient admitting in emergency department and ICU of selected hospital of Kamrup (M), Assam.

Operational definition
Duration

In this study, duration means the time taken in starting the care by health care professionals to patient admitting in Emergency department and ICU of selected hospital of Kamrup (M), Assam.

Initiation

In this study, initiation means starting of care by health care professionals to patient admitting in Emergency department and ICU of selected hospital of Kamrup (M), Assam.

Treatment

In this study, treatment means medical services provided by the doctors and staff nurses to stroke and head injury patient admitting in Emergency and ICU. Medical services include history taking, physical examination, investigation and medication.

Health care professionals

In this study, health care professionals mean the same and it includes Doctors and Staff nurses.

Patient

In this study, Patient means the same and it includes Stroke and Head Injury patients.

Assumption

The study assumes that early initiation of treatment by health care professionals may have better impact in prognosis.

Delimitation

The study was delimited to doctors and nurses working in Emergency department and Intensive Care Unit.

Scope of the study

- The study will help to find out the length of time in initiating treatment by health care professionals to patient admitting in Emergency department and ICU.
- The finding of the study will bring awareness to do further related studies.
- The findings of the study may help in protocol development in minimizing delay treatment.
- The findings of the study can be communicated to the health care institution to emphasis on management of patient in Emergency and ICU in order to improve the quality of care.
- The study will help to identify the factors contributing to time gap in initiating treatment by health care professionals to patient admitted in Emergency department and ICU.

Summary

This chapter deals with the background of the study, need of the study, problem statement, objectives of the study, operational definition of terms, assumptions, delimitations and scope of the study.

Chapter ii
Review of literature

The review of literature for the study has been presented under the following headings:

- **Section I:** Review of literature related to general information of head injury and stroke.
- **Section II:** Review of literature related to general turnaround time of treatment in hospitals.
- **Section III:** Review of literature related to transfer, admission of patient and its outcome.

Section I: Review of literature related to general information of head injury and stroke

Gerritsen H *et al*. (2018) [13] conducted a retrospective cohort study to assess incidence, course and risk factors of head injury. The findings of the incidence of overall head injury were 22.1 per 1000 person-years and the incidence of a complicated course following head injury was 0.16 per 1000 person-years. The following determinants were risk factors for a complicated course: high energy trauma, bicycle accident, traffic accident in general, use of anticoagulants, alcohol intoxication, age above 60 years and low Glasgow Coma Scale at initial presentation. A complicated course was very unlikely when the patients' first encounter with a healthcare professional was in primary care (OR 0.03, 95% CI 0.01 to 0.07). Complication after head injury is rarely seen in general practice. Patients who do experience complications are often easily identifiable as requiring specialist care. A more reserved referral policy for general practice may be desirable, suggesting that current guidelines are too defensive. This study concludes that TBI predominantly affects young male population and most of these are preventable. Early transportation to the hospital and first aid results in good outcome. Mortality increases with the severity of TBI and associated injuries therefore multimodality approach in polytrauma is essential.

Kamalakannan S *et al*. (2017) [14] conducted a cross-sectional and cohort studies on incidence and prevalence of stroke in India by using a structured format outline from Cochrane handbook. A total 3221 records were searched and only 78 records were selected that were eligible for full-

text review. The findings of the study showed that the cumulative incidence of stroke in India ranged from 105 to 152/100,000 persons per year and the crude stroke prevalence in different parts of India ranged from 44.29 to 559/100,000 persons. In The study it was found that the stroke incidence and prevalence are high in higher income countries.

Varghese R, Chakrabarty J, Menon G (2017) [11] conducted a comprehensive literature review on the nursing management of adults with severe traumatic brain injury following databases: Google Scholar, Cochrane, J-Gate, Pro-Quest, and Science Direct from 2000 to 2016 for retrieving the related studies. The objectives of the study are to analyze the pertinently available research and clinical studies that demonstrate the nursing management strategies for adults with STBI and to synthesize the available evidence based on the review. In the included studies, data were extracted and evaluated according to the objective. Narrative analysis was adopted to write this review. The findings of the review were patients with STBI have poor prognosis and require quality care for maximizing patients' survival. With a thorough knowledge and discernment of care of such patients, nurses can improve these patients' neurological outcomes.

Smith NCE et al. (2013) [16] conducted a study to assess the management of trauma victims with head injury: a study by the National Confidential Enquiry into Patient Outcome and Death. Severely injured patients with an injury severity score (ISS) of ≥16 was included in the study. Of the 795 patients who met the inclusion criteria for the study, 493 were admitted with a head injury. Room for improvement in the level of care was found in a substantial number of patients (265/493). Good practice was found to be highest in high volume centres. The overall head injury management was found to be satisfactory in 84% of cases (319/381). This study conclude that care for trauma patients with head injury is frequently rated as less than good and suggests potential long-term remedies for the problem, including a reconfiguration of trauma services and better provision of neurocritical care facilities.

The above studies helped the investigator to understand the magnitude of Stroke and Head injury.

Section II: review of literature related to general turn around time of treatment in hospitals

According to the protocol followed by Sri Lakshmi Medical Centre and Hospital, Thudiyalur, Coimbatore, initial assessment should be carried out within one hour of admission by Residential Medical Officer/ Treating Doctor or DMO and to document the same within the 24 hours of Admission. Initial assessments of Patient at emergency ward are to be carried out by Nurse, RMO immediately, as soon as patient arrives at emergency ward. Nursing Initial Assessment is done within 30 minutes of patient admission into the ward.

According to American Heart / Stroke association (2011) the target Stroke campaign manual has set a goal that patient with ischemic stroke has to achieve a door to needle time within 60minutes after the patient arrived in the hospital. The time interval goals in which the ASA had target are as to perform an initial patient evaluation within 10 minutes of arrival in the emergency department, notify the stroke team within 15 minutes of arrival, initiate a CT scan within 25 minutes of arrival, interpret the CT scan within 45 minutes

of arrival and ensure a door-to-needle time for IV rt-PA within 60 minutes from arrival.

According to National Institute of Health and Care Excellence (NICE) Guideline of Head Injury assessment and early management, the patients presenting to the emergency department with impaired consciousness (GCS less than 15) should be assessed immediately by a trained member of staff and in patients with GCS 8 or less, ensure there is early involvement of an anesthetist or critical care physician to provide appropriate airway management. A trained member of staff should assess all patients presenting to an emergency department with a head injury within a maximum of 15 minutes of arrival at hospital and Part of this assessment should establish whether they are high risk or low risk for clinically important brain injury and/or cervical spine injury. Patient who have sustained head injury should perform a CT head scan within 1 hour of the risk factor being identified.

Mwogi T et al. (2020) [20] conducted a time-motion study on therapeutic turnaround times for common laboratory tests in a tertiary hospital in Kenya. A total of 356 laboratory tests were fully tracked from the time of ordering to availability of results to care providers. The findings of the study showed that the total therapeutic TAT for all tests was 21.5±0.249 hours. The therapeutic TAT for hematology was 20.3±0.331 hours while that for biochemistry tests was 22.2±0.346 hours. Printing, sorting and dispatch of the printed results emerged as the most significant bottlenecks, accounting for up to 8 hours of delay. This study concludes that there are significant inefficiencies exist at multiple steps in the turnaround times for routine laboratory tests at a large referral hospital within an LMIC setting. Multiple opportunities exist to improve TAT and streamline processes around diagnostic testing in this and other similar settings.

Bhattarai K, Manandhar N (2018) [21] conducted a study to assess the turnaround time in clinical chemistry laboratory: a hospital-based study on billing-to-reporting and collection-to-reporting times among 1737 clinical chemistry samples at Central Clinical Laboratory, College of Medical Sciences and Teaching Hospital, Bharatpur, Chitwan, Nepal. The finding of the study showed that the median billing-to-reporting time was 138 minutes and collection-to-reporting time was 98 minutes. These turnaround times were significantly lesser in the casualty and OPD samples as compared to the non-casualty and IPD samples, respectively; and highest in the surgical samples. Additionally, the samples billed or collected during night shift were reported slowly as compared to those billed or collected during the morning shift; the trend was consistent for casualty and non-casualty samples; OPD samples; and samples from different departments. Lastly, only 2.7% of the samples were reported within 60 minutes of billing, 42.8% within 120 minutes and 72.3% within 180 minutes; 10.9% of the samples were reported within 60 minutes of collection, 66.4% within 120 minutes and 91.2% within 180 minutes.

Gaurav KS et al. (2018) conducted a study to assess the Impact of "Stroke Code"-Rapid response team to improve intravenous thrombolysis rate and to shorten door-to-needle time in acute ischemic stroke at Ruby Hall Clinic, Maharashtra. Patients presented with stroke symptoms in pre- and post-SC era (695 vs. 610) and, out of these, patients who came in window period constituted of 21% (148) and

34% (210), respectively. Patient's thrombolyzed in pre- and post-SC era were 29.7% (44) and 44.52% (65), respectively. Average DTN time was 104.95 min in pre-SC era and reduced to 67.28 min ($p<0.001$) post-SC implementation. Percentage of patients' thrombolyzed within DTN time ≤60 min in pre-SC era and SC era was 15.90% and 55.38%, respectively. This study concluded that implementation of SC helped to increase thrombolysis rate in AIS and decrease DTN time.

Rimma P *et al.* (2018) conducted a study on Improving Emergency Department Flow: Reducing Turnaround Time for Emergent CT Scans in USA. 10,063 CT scans were ordered in emergency department over an 8 month pre-intervention period, the average time from a CT order to the availability of the radiologist's final report was 5.9 hours (median=4.2 hours). This study has created a multi-disciplinary team of physicians, nurses, technicians, transporters, informaticians, and engineers to identify barriers and implement technical as well as human-factors solutions. This study findings were that in the corresponding 8 month period after the implementation of the intervention bundle, there was a 1.2 hour reduction in CT turnaround time, despite a 13.8% increase in the number of CT scans ordered ($p<0.0001$).

Stephen G *et al.* (2017) [24] conducted a pre–post interventional study regarding the quality improvement intervention in reducing the time to administration of stat medications among patients admitted to the pediatric units in a private hospital in Saudi Arabia. The interventions included in the study was a structured communication requirement, introduction of a dedicated electronic inbox for stat medication orders sent by nurses to the pharmacy, and the use of a pink envelope for the delivery of stat medications. The findings of the study show that 304 stat orders met inclusion criteria. The proportion of orders meeting the 30-minute goal increased from a mean of 20% to a mean of 49% after the interventions. In the final month of the study, compliance reached a peak of 67%. The mean turnaround time from ordering to the administration of the medication decreased from 59.7 to 40.7 minutes. On multivariate analysis, medication type and unit-based availability of medications were statistically significant predictors of turnaround time. The odd of compliance being achieved was 0.3 times less if the medication was not available on the unit.

Wankar DA. (2017) [25] conducted a study to determine the laboratory turnaround time at Yashoda hospital, Secunderabad, India. This study aims to evaluate the delay and reason of delay of turnaround time (TAT) of stat tests in section of clinical chemistry of the clinical laboratory. Out of total 232 samples, 78.88% (183) samples were taken for analysis. 54.65% (100) samples were within TAT time and 45.35% (83) samples were delayed. Out of total 83 samples which were delayed, 57.83% (48) samples had TAT between 60 minutes to 90 minutes, 26.51% (22) samples had TAT between 90 minutes to 120 minutes, 10.84% (9) samples had TAT between 120 minutes to 180 minutes, and 4.82% (4) samples had TAT over 180 minutes. Average time between sample collection and lab reach was observed to be 15 min. 38 sec. Transport delay was observed. Instrumentation failure was observed in biochemistry - 2 times and thyroid - 1 time.

Bhatt DR, Shrestha C, Risal P. (2017) [25] conducted an observational descriptive study on Factors affecting turnaround time in the clinical laboratory of the Kathmandu University Hospital, Nepal. A total of 36,108 patients' reports generated from the Department of Clinical Biochemistry Laboratory during study period were analyzed. The findings of the study were nearly 36% of reports exceeded the predefined TAT in case of stat tests, while around 7% of reports were out of predefined TAT in case of routine tests. Among prolonged TAT, around 75% of reports were delayed due to various extra analytical reasons and approximately 48% of total delayed reports were found only due to error by cash unit. The major reasons of delayed laboratory reports were due to time consumed to fix the pre-analytical errors created by other departments rather than laboratory itself. Cash unit alone has the highest degree of error in total testing process and it is the most significant factor for prolonged TAT.

Reznek AM *et al.* (2017) [27] conducted a retrospective study among 463 acute stroke patients to find out the door-to-imaging time and effect of crowding in emergency department. In the regression model, ED occupancy rate emerged as a predictor of DIT, with odds ratio of 0.83 of DIT within 25 minutes per 10% absolute increase in ED occupancy rate. The secondary analysis estimated that ED operational factors accounted for nearly 14% of the algorithm's prediction of DIT. This study concluded that ED crowding is associated with reduced odds of meeting DIT goals for acute stroke. In addition to improving stroke-specific processes of care, efforts to reduce ED overcrowding should be considered central to optimizing the timeliness of acute stroke care.

Nakibuuka J *et al.* (2016) [28] conducted a non-randomised controlled study to assess the effect of a 72 hour stroke care bundle on early outcomes after acute stroke among 127 stroke patients who had 'usual care' (control group) were compared to 127 stroke patients who received selected elements from an ICP (intervention group) at accident and emergency unit (A&E) at Mulago hospital, Uganda. The findings of the study showed that the mortality within 7 days was higher in the intervention group compared to controls. There was no difference in 30-day mortality between the two groups. There was better 30-day survival in patients with severe stroke in the intervention group compared to controls. The median survival time was 30 days in the control group and 30 days in the intervention group. In the intervention group, 32.3% (41) patients died in hospital compared to 18.1% (23) patients in controls. The median length of hospital stay was 8 days in the controls and 4 days in the intervention group. There was no difference in functional outcomes between the groups. This study concluded that while implementing elements of a stroke-focused ICP in a Ugandan national referral hospital appeared to have little overall benefit in mortality and functioning, patients with severe stroke may benefit on selected outcomes. More research is needed to better understand how and when stroke protocols should be implemented in sub-Saharan African settings.

Raghuvanshi PV, Choudhary H. (2013) [29] conducted a study on medication turnaround time in hospital pharmacy department among 300 medication indents at Institute of Health Management & Research, Jaipur, India and Govt. hospital Gandhinagar, Ahmedabad, India. Out of 300 indents, 56.6% were normal indents, 26.6% were new admission indents and 16.6% were urgent indents. Both primary and secondary data has been used in the study. The

secondary data was obtained from the track care software, which was used in the pharmacy. The findings of the study show that 25.2% of the normal indents, 48.7% of the new admission indents and 60% of the urgent indents were delayed. In addition, the average time taken to deliver normal indent was found to be 1hour 8 minutes, for new admission indent it was 48 minutes and for urgent indent it was 1hr 20 minutes i.e. more than the normal indent and new admission indent.

Suljic E, Mehicevic A, Gavranovic A. (2013) [1] conducted a retrospective study on Stroke Emergency Medical Care: Initial Assessment, Risk Factors, Triage and Hospitalization Outcome among 233 patients diagnosed with acute stroke referred by the Institute for Emergency Medical Care (IEMC) in the Clinical Center of Sarajevo University (CCSU). The findings of the study showed that out of 233 patients, 152 (65%) are female, while 81(35%) of patients were male. The time of IEMC team starts from a period of receiving a call to a dispatch center, team's referral, team arrival on site, review of patient care and treatment of the patient, patient transportation and handing over the patient to hospital team. Minimum time for emergency medical team arrival was 6 minutes and maximum 70 minutes. In 73% of patients the diagnosis was confirmed. In 5% of patient's thrombolytic therapy was administered, while 95% of patients were treated conservatively. This study concluded that 91% of patient's consciousness was preserved. In 73% of transported patients has been confirmed the diagnosis of ischemic stroke. Of the patients with confirmed diagnosis 59% were hospitalized. A significant number of strokes occur for the first time in relation to relapse. 5% of patients were treated with thrombolysis, while others were treated with conservative therapy. Recurrent stroke and patient confusion have significant impact on the outcome.

Maestroni A *et al*. (2008) [31] conducted a study to assess the factors influencing delay in presentation for acute stroke among 537 patients admitted in an emergency department in Milan, Italy. Over a one-year period 537 patients with acute stroke were evaluated; 375 patients in whom arrival delay was ascertainable were included in the study. Out of 375 patients, 64% (240) patients were ischaemic stroke, 16% (61) patients were haemorrhagic stroke and 20% (74) were transient ischaemic attack. Median arrival delay was 5.4 hrs, 28% (104) patients arrived within 3 hrs and 53% (198) within 6 hrs. Triage-visit delay was 0.3 hr, visit-CT scan delay was 1.2 hrs, visit-CT report delay was 2.7 hrs. Triage-visit delay and visit-CT delay were shorter for patients presenting within 3 hrs. Out of 537 patients, 57% (214) patients arrived with the EMS; 86% (323) patients presented with symptoms during the day, 70% (261) were admitted during working days. Univariate analysis showed a significantly shorter arrival delay in patients calling the EMS (median 4.2 vs 7.2 h; *p*<0.001) and in patients with a higher basal mNIHSS score (Spearman rho = -0.204; *p*<0.001) or altered level of consciousness (normal 5.8 h, not alert but arousable 3.8, not alert but arousable with strong stimulation 2.5, totally unresponsive 6.0; p = 0.005). Multivariate analysis showed that use of the EMS and higher basal mNIHSS score were independent variables associated with a shorter arrival delay.

The above studies helped the investigator to understand the turn around time about the initiation of treatment and its

impact on the health status of the patient. It also helped the researcher in formation of tool and the design for the study.

Section III: Review of literature related to transfer, admission of patient and its outcome

Groenland NL *et al*. (2019) [32] conducted a retrospective observational cohort study on Emergency Department to ICU time to find out its association with hospital mortality. In this study, 14,788 patients were included from six university hospitals in Netherlands. The findings of the study showed that the median emergency department to ICU time was 2.0 hours. Emergency department to ICU time was correlated to adjusted hospital mortality, in particular in patients with the highest Acute Physiology and Chronic Health Evaluation IV probability and long emergency department to ICU time quintiles: odds ratio (2.4-3.7 hr) and odds ratio (> 3.7 hr), both compared with the reference category (< 1.2 hr). For 30-day and 90-day mortality, similar results were found. However, emergency department to ICU time was not correlated to adjusted ICU mortality (p = 0.20). This study concluded that prolonged emergency department to ICU time (> 2.4 hr) is associated with increased hospital mortality after ICU admission, mainly driven by patients who had a higher Acute Physiology and Chronic Health Evaluation IV probability. Thus this provides evidence that rapid admission of the most critically ill patients to the ICU might reduce hospital mortality [32].

Khanduri S *et al*. (2017) [33] conducted a study on retrospective review regarding the profile of ICU admissions and outcomes among of 2316 patients admitted in a tertiary care hospital of Himalayan region. The result showed that out of 2316 patients admitted in the ICU, majority 64.3% (1489) of the patients were males and about 35.7% (827) were females. About 42.8% of the patients were between (46-70) years. 48.5% of the patients were shifted from the Emergency to ICU and was associated with better outcome. A total of 49.6% patients were shifted out of ICU in stable condition while mortality was 28.6%. Around 21.8% patients left ICU against Medical advice. This study concluded that majority of the patients admitted to ICU were of general medicine and neurosurgery. Mortality was not associated with sex and the outcome of the conditions of the patient was also related to the source from where patient was admitted.

Orsini J *et al*. (2016) [34] conducted a prospective, observational study among 282 patients regarding the effects of time and day of admission on the outcome of critically ill patients admitted to ICU in a community inner-city hospital, Brooklyn, New York. The findings of the study showed that out of 282 patients, majority 55.7% (157) mean age was 59.5 years. Mean Acute Physiology and Chronic Health Evaluation (APACHE)-II score was 18.9, and mean ICU length of stay was 3.1 days. Of the 282 patients, 36.9% (104) of the patients were admitted during weekends and 163.1% (178) during weekdays. 43.3% (122) patients were admitted after-hours, constituting 68.5% of all admissions during weekdays. 19.9% (56) patients were admitted during daytime hours, representing 31.5% of all weekday admissions. 15.9% (45) died in ICU. Compared to patients admitted on weekends, those admitted on weekdays had increased ICU mortality. From the above findings this study concluded that admissions to ICU during weekends were not independently associated with increased mortality.

Afessa B *et al*. (2009) [35] conducted a retrospective study to assess the association between ICU admission during morning rounds and mortality among 49,844 patients admitted in the ICU, Mayo Medical Center. Of these patients, 3,580 were admitted to the ICU during round time (8:00 am to 10:59 am) and 46,264 were admitted during non-round time (from 1:00 pm to 6:00 am). Data were abstracted from the acute physiology and chronic health evaluation (APACHE) III database. The findings of the study show that the round-time and non-round-groups were similar in gender, ethnicity, and age. The predicted hospital mortality rate of the round time group was higher (17.4% vs 12.3% predicted, respectively). The hospital length of stay was similar between the two groups. The round-time group had a higher hospital mortality rate (16.2% vs 8.8%, respectively). Most of the round-time ICU admissions and deaths occurred in the medical ICU. Round-time admission was an independent risk factor for hospital death. This study concluded that patients admitted to the ICU during morning rounds have higher severity of illness and mortality rates.

The above studies helped the investigator to understand that delay in initiation of treatment may have an impact on the patient and also increase the hospital mortality rates.

Chapter- III
Research methodology
Research approach: The research approach used for this study was Quantitative approach.

Research design
The research design selected for this study was Descriptive research design.

Setting of the study
The study was conducted in Guwahati Neurological Research Center Hospital at Dispur, Six mile and North Guwahati of Kamrup (M) Assam.

Variables
Variables included in the study are
Research variable: In this study, the research variable was Initiation of treatment.

Demographic variable
In this study, the demographic variables were age, gender, educational qualification, total years of working experience, years of experience in Intensive Care Unit.

Population
In this study, the population was referred to the Health Care Professionals.

Target population: In this study, the target populations were Health Care Professionals working in Emergency department and ICU.

Accessible population
In this study, it refers to the Health Care Professionals working in Emergency and ICU of selected hospital of Kamrup (M), Assam.

Samples and sampling technique
Sample: In this study, the samples are Health Care Professionals who are working in Emergency and ICU of selected hospital of Kamrup (M), Assam and fulfill the inclusion criteria.

Sample Size: In this study, the sample size was 78, out of which 26 were Staff nurses and 52 were Doctors working in Emergency and ICU department of GNRC hospital, Kamrup (M), Assam.

Sampling technique
In this study, the researcher used the Non- probability convenience sampling technique.

Criteria for sample selection
The following criteria were used in the present study to select samples.

Inclusion criteria: In this study, the inclusion criteria were those
1. Who was present during the data collection Period.
2. Who were willing to Participate.

Exclusion criteria: In this study, the exclusion criteria were those who is on leave for 5 days continuously during the data collection period.

Tools and techniques
The tool used in the study was Observation checklist.

Technique: In this study, the technique used for this study was Observation.

Description of the tool
The tool used for the study consisted of five (5) sections.

Section A: Demographic variables of staff nurses – It consisted of age, gender, educational qualification, total years of working experience, years of experience in ICU.

Section B: Demographic variables of Doctors – It consisted of age, gender, educational qualification, years of experience.

Section C: Checklist for Staff nurses working in Emergency Department consisted of Observation checklist to assess the duration in initiation of treatment by staff nurses to stroke and head injury patient.

Section D: Checklist for Staff nurses working in Intensive Care Unit consisted of Observation checklist to assess the duration in initiation of treatment by staff nurses to stroke and head injury patient.

Section E: Checklist for Doctors consisted of Observation checklist to assess the duration in initiation of treatment by doctors to stroke and head injury patient admitting in emergency department and ICU.

Validity of the tools
The prepared instrument along with the problem statement, objectives and tools were submitted to two experts in the field of Critical Care, one expert of Community Health Nursing, six experts of Medical Surgical Nursing.

Chapter IV
Data Analysis and Interpretation
The data collected through structured observation tool was tabulated, analyzed and interpreted by using descriptive statistics, which are necessary to provide a substantive summary of results to the objectives.

Presentation of data
The data were grouped and analyzed under the following sections.

Section I: Frequency and percentage distribution of Staff nurses according to their demographic variables.

Section II: Frequency and percentage distribution of Doctors according to their demographic variables.

Section III: Frequency and percentage distribution of Initiation of treatment by health care professionals.

Section I
Frequency and percentage distribution of staff nurses according to their age
Data presented shows that out of 26 staff nurses, 22(85%) belonged to 21-30years of age group, 3(11%) belonged to 31-40 years of age, 1(4%) belonged to age group of 41-50years of age and no one belonged to 51-60years of age group.

Frequency and percentage distribution of staff nurses according to gender
Data presented shows that out of 26 staff nurses, 2(8%) staff nurses were male and 24(92%) staff nurses were female.

Frequency and percentage distribution of staff nurses according to educational qualification
Data presented shows that out of 26 staff nurses, 17(65%) staff nurses were GNM, 8(31%) were BSc Nursing, 1(4%) were Post basic BSc Nursing and no MSc Nursing staff.

Frequency and percentage distribution of staff nurses according to total years of working experience
Data presented shows that out of 26 staff nurses, 14(54%) were having <2years, 7(27%) were having 2-4years, 1(4%) were having 4-6 years and 4(15%) were having >6 years of total working experience.

Frequency and percentage distribution of staff nurse according to years of experience in ICU
Data presented shows that out of 26 staff nurses, 12(46%) staff nurses were having <1year experience, 11(42%) were having 1-6years of experience, 3(12%) were having >6 years" experience in ICU.

Frequency and percentage distribution of doctors according to their age
Data presented shows that out of 52 Doctors, 33(63%) belong to 25-35years of age, 14(27%) belong to 35-45 years of age, 4(8%) belong to 45-55years of age and 1(2%) belong to >55years of age group.

Frequency and percentage distribution of doctors according to gender
Data presented shows that out of 52 Doctors, majority 41(79%) were male and 11(21%) were female.

Frequency and percentage distribution of doctors according to educational qualification
Data presented shows that out of 52 Doctors, 32(62%) were MBBS, 3(6%) were DNB, 10(19%) were MD and 7(13%) were MCH.

Frequency and percentage distribution of doctors according to years of experience
Data presented shows that out of 52 Doctors, 26(50%) were having <5years, 18(35%) were having 5-10 years, 2(4%) were having 10-15 years and 6(11%) were having >15 years of experience.

Section III

Table I: Frequency and percentage distibution of initiation of treatment by staff nurses in emergency department

Sl.no	Content	Average time (in min)	Less than average		More than average	
			Frequency	Percentage	Frequency	Percentage
A	Information about admission of patient	1min 11secs	8	62%	5	38%
B	Preparation of Patient Unit	2mins 6secs	7	54%	6	46%
C	Others					
	a)Receiving the patient by the assigned Nurse	5mins 32secs	8	62%	5	38%
	b) Shifting the Patient to bed	2mins	6	46%	7	54%
	c) Applying ECG Leads and connecting to monitor	1min 46secs	9	69%	4	31%
	d) Checking the vitals	1min 49secs	8	62%	5	38%
	e) Checking the GCS & Pupillary	1min 37secs	5	38%	8	62%
	f) Checking the Oxygen saturation and administration of oxygen	1min 34secs	8	62%	5	38%
	g) Medication					
	1. Checking the Physician order	1min 2secs	12	92%	1	8%
	2. IV Cannulation and starting of IV Fluids	6mins 54secs	6	46%	7	54%
	3. Time of starting of Medication	5mins 20secs	4	31%	9	69%
	h) Investigation					
	1. Check Physician order	2mins 22secs	9	69%	4	31%
	2. Time of sending & receiving the requisition for Payment	16mins 18secs	9	69%	4	31%
	3.Time of informing & sending the patient to Investigation room	17mins 46secs	7	54%	6	46%
	4. Time of receiving the patient from investigation room	19mins 48secs	6	46%	7	54%
D	Time of transferring the patient to ICU	41mins 48secs	7	54%	6	46%
	Total	131mins 35secs	7	54%	6	46%

Table 2: Frequency and percentage distribution of initiation of treatment by staff nurses in ICU

Sl. No	Content	Average time (in min)	Less than average		More than average	
			Frequency	Percentage	Frequency	Percentage
A	Information about admission of patient	2mins 43secs	8	62%	5	38%
B	Preparation of Patient Unit	3mins 32secs	6	46%	7	54%
C	Others					
	a)Receiving the patient by the assigned Nurse	8mins 31secs	6	46%	7	54%
	b) Shifting the Patient to bed	3mins 3secs	10	77%	3	23%
	c) Handover taken about the patient	2mins 11secs	8	62%	5	38%
	d) Applying ECG Leads and connecting to monitor	2mins 31secs	7	54%	6	46%
	e) Changing Clothing of the Patient	9mins 38secs	5	38%	8	62%
	f) Remove ornaments and handover to the attendant	3mins 58secs	6	46%	7	54%
	g) Perform physical examination	6mins 43secs	5	38%	8	62%
	h) Medication					
	1. Checking the Physician order	1min 11secs	8	62%	5	38%
	2. Checking the Patency of IV Cannula and starting of IV Fluids	4mins 17secs	5	38%	8	62%
	3. Time of starting of Medication	8mins 34secs	6	46%	7	54%
	4. Indenting the Medication	5mins 18secs	6	46%	7	54%
	5. Time of sending and receiving of Medication	26mins 25secs	6	46%	7	54%
	i) Investigation					
	1. Check Physician order	1min 2secs	12	92%	1	8%
	2. Time of sending & receiving the requisition for Payment	17mins 5secs	9	69%	4	31%
	3. Blood collection	8mins 43secs	7	54%	6	46%
	4. Time of collecting of verbal report	147mins 18secs	7	54%	6	46%
	5. Time of informing the report to the physician	6mins 42secs	7	54%	6	46%
	6. Collection of Hard copy of report	1349mins 14secs	2	15%	11	85%
	7. Time of collecting of the Film	87mins 18secs	8	62%	5	38%
	8. Time of collecting hard copy of report (X-ray/CT)	1440mins	0	0%	13	100%
	TOTAL	3146mins 45secs	3	23%	10	77%

Table 3: Frequency and percentage distribution of initiation of treatment by doctors

Sl. No	Content	Average time (in min)	Less than average		More than average	
			Frequency	Percentage	Frequency	Percentage
I	Intensivist					
	Attending the patient	5mins 46secs	6	46%	7	54%
	Collection of brief history	6mins	6	46%	7	54%
	Perform physical examination	5mins 12secs	8	62%	5	38%
II	Casuality Doctor					
	Attending the patient	2mins 17secs	7	54%	6	46%
	Collection of brief history	4mins 18secs	6	46%	7	54%
	Perform physical examination	4mins 32secs	8	62%	5	38%
III	Consultant					
	Attending the patient	55mins 55secs	7	54%	6	46%
IV	Resident Doctor					
	Attending the patient	16mins 43secs	9	69%	4	31%
	Collection of brief history	9mins 12secs	7	54%	6	46%
	Perform physical examination	5mins 11secs	8	62%	5	38%
V	Medication					
	Prescribing and explaining the nurses about the medication	5mins 52secs	6	46%	7	54%
VI	Investigation					
	Prescribing and explaining the nurses about the investigation	5mins 32secs	6	46%	7	54%
VII	Time taken for initial visit					
	Casuality Doctor	2mins 17secs	7	54%	6	46%
	Resident Doctor	16mins 43secs	9	69%	4	31%
	Intensivist	5mins 46secs	6	46%	7	54%
	Consultant	55mins 55secs	7	54%	6	46%
	Total	190mins 30secs	7	54%	6	46%

Chapter V

Discussion: The findings of the study had been discussed in terms of the objectives. The present study was conducted to assess the duration in initiation of treatment by health care professionals to patient admitting in selected hospital of Kamrup (M), Assam. Data was collected from 78 health care professionals of which 26 were staff nurses and 52 were doctors. The discussion in this chapter was based on the findings obtained from the statistical analysis and interpretations in the previous chapter. The obtained data were entered into master sheet for tabulation and statistical processing. The findings of the study are compared with those of other similar studies. The discussion of the findings of the study is presented below.

Discussion in relation to initiation of treatment by the health care professionals

To first objective of the study was to assess the duration in initiation of treatment by the staff nurses to patient admitting in emergency department and ICU

The average time taken by the emergency staff nurses to perform physical examination was 5mins and ICU staff nurses was 6mins 43secs. Out of 13 ICU staff nurses, majority 8(62%) had taken more than 6mins43secs. Out of 13 emergency staff nurses, majority 8(62%) had taken less than the average time for checking vitals and oxygen saturation and majority 8(62%) had taken more than the average time for checking the GCS and pupillary response. The average time taken by the emergency staff nurses for starting the initial assessment was 5mins 32secs and ICU staff nurses was 8mins 31secs. The starting of the initial assessment was taken from the time when they received the patient at the department.

The analysis revealed that the average time taken for initiation of investigation for CT scan/ X-ray was 56mins 14secs. The average time for initiation of CT/ X-ray investigation was taken from the time when the staff nurses checked the physician order to the time of receiving the patient from the investigation room.

The findings of the present study are supported by the study done by Rimma P et al. (2018) on Improving Emergency Department Flow: Reducing Turnaround Time for Emergent CT Scans in USA. 10,063 CT scans were ordered in emergency department over an 8-month pre-intervention period. They found that the average time from a CT order to the availability of the radiologist's final report was 5.9 hours (median=4.2 hours) and after the implementation of the intervention bundle, there was a 1.2-hour reduction in CT turnaround time [27].

The average time for initiation of blood investigation was 180mins 50secs. The average time for initiation of blood investigation was taken from the time when the staff nurses checked the physician order to the time, she informed the report to the physician.

The findings of the present study are supported by the study done by Mwogi T et al. (2020) [20] on therapeutic turnaround times for common laboratory tests. A total of 356 laboratory tests were fully tracked from the time of ordering to availability of results to care providers. They found that the total therapeutic TAT for all tests was 21.5±0.249 hours. The therapeutic TAT for hematology was 20.3±0.331 hours while that for biochemistry tests was 22.2±0.346 hours. Printing, sorting and dispatch of the printed results emerged as the most significant bottlenecks, accounting for up to 8 hours of delay [20].

The initiation of investigations (CT scan, X-ray) was performed in the emergency department whereas the blood investigation was done in the ICU.

The analysis revealed that the average time taken for initiation of medication by an emergency staff nurses was 13mins 16secs and the average time was taken from the time of checking the physician order to the time of starting the medication. The average time taken for initiation of medication by the ICU staff nurses was 14mins 2secs and the average time was taken from the time of checking the physician order to the time of starting the medication.

The findings of the present study are supported by the study done by Stephen G et al. (2017) [24] on quality improvement intervention in reducing the time to administration of stat medications among patients. 304 stat orders were selected based on the inclusion criteria. The proportion of orders meeting the 30-minute goal increased from a mean of 20% to a mean of 49% after the interventions. They found that the mean turnaround time from ordering to the administration of the medication decreased from 59.7 to 40.7 minutes [22].

The average time taken by the ICU staff nurses for indenting the medication and receiving the medication is 31mins 43secs. Majority of ICU staff nurses 7 (54%) had taken more than 31mins 43secs in indenting the medication and receiving the medication.

The findings of the present study are supported by the study done by Raghuvanshi PV, Choudhary H. (2013) [29] on medication turnaround time in hospital pharmacy department among 300 medication indents. Out of 300 indents, 56.6% were normal indents, 26.6% were new admission indents and 16.6% were urgent indents. The findings showed that 25.2% of the normal indents, 48.7% of the new admission indents and 60% of the urgent indents were delayed. In addition, the average time taken to deliver normal indent was found to be 1hour 8 minutes, for new admission indent it was 48 minutes and for urgent indent it was 1hr 20 minutes i.e., more than the normal indent and new admission indent [25].

The second objective was to assess the duration in initiation of treatment by the doctors to patient admitting in emergency department and ICU

The analysis revealed that, the average time taken of brief history collection about the patient by the Casualty doctor at emergency department was 4mins 18secs and Resident doctor had taken 9mins12secs and the Intensivist at ICU had taken 6mins. Out of 13 Casualty doctor, majority 7(54%) had taken more than 4mins 18secs of brief history collection. Out of 13 Resident doctors, majority 7(54%) had taken less than 9mins 12secs of brief history collection. Out of 13 Intensivist, majority 7(54%) had taken more than 6mins of brief history collection.

The analysis revealed that, the average time taken to perform physical examination by the Casualty doctor at emergency department was 4mins 32secs and Resident doctor had taken 5mins11secs and the Intensivist at ICU had taken 5mins 12secs. Out of 13 Casualty doctor, majority 8(62%) had taken less than 4mins 32secs to perform physical examination. Out of 13 Resident doctors, majority 8(62%) had taken less than 5mins 11secs to perform physical examination. Out of 13 Intensivist, majority 8(62%) had taken less than 5mins 12secs to perform physical examination. The average time taken in assessing the patient after getting the information about the patient arrival from the resident doctor was within 55mins55secs and out of 13 Consultant, majority 7(54%) had assessed within less than the average time.

The findings of the present study are supported by the study done by the health care team of St. Joseph's Health Care Hamilton on development of Initial Assessment Process and implementation in emergency care. They found that Physician Initial Assessment time prior to the implementation of Initial Assessment Process was 3.5 hours and during IAP, our median PIA time is 20 minutes, including triage and registration [42].

The analysis revealed that the average time taken for initial visit by the Casualty doctor was 2mins 17secs and majority

7 (54%) had visited the patient after arrival in emergency in less than 2mins17secs. The average time taken for initial visit by the Resident doctor after getting the information from the Casualty doctor was 16mins 43secs and majority 9 (69%) had visited the patient after arrival in emergency in less than 16mins 43secs. The average time taken for initial visit by the Intensivist at ICU was 5mins 46secs and majority 7 (54%) had visited the patient in more than 5mins 46secs. The average time taken for initial visit by the Consultant after getting the information about the patient from the resident doctor was 55mins 55secs and majority 7 (54%) had visited the patient in less than 55mins55secs. The investigator had found that some of the health care professionals (Casualty doctor, resident doctor and consultant) had visited the patient in more than the average time because of the factors like attending another patient during the arrival of the patient and giving rounds in other unit of the hospital.

The findings of the study are supported by the study done by El-Sayed JM *et al.* (2015) [43] on Improving Emergency Department Door to Doctor Time and Process Reliability A Successful Implementation of Lean Methodology at the Emergency Department. The findings of the study showed that there was significantly decrease in the mean to door to doctor time measure (40.0 minutes$\pm$53.44 vs 25.3 minutes$\pm$15.93 $p<0.001$) (40.0 minutes + 53.44 vs 25.3 minutes+ 15.93 $p<0.001$) in the post intervention phase [43].

Summary: This chapter deals with the summary of the findings and comparison with other studies. The discussion was done in terms of demographic factors and the initiation of treatment by the health care professionals.

Chapter VI
Summary, findings, conclusion, limitation, implication and recommendations

Conclusion
The initiation of treatment by the health care professionals was started from the time the patient arrived at the emergency department till the patient is shifted and initiated the treatment in ICU. The care given by the health care professionals to stroke and head injury patient admitted to emergency and ICU was observed and the timing was recorded. In this study it was found that the minimum time taken for brief history collection was 4mins 18secs and the maximum time was 9mins 12secs. The minimum time for performing physical examination was 4mins 32secs and maximum time was 6mins 43 sacs. For initiation of medication, the minimum time taken was 13mins 16secs and the maximum time was 14mins 2secs. The minimum time taken for initial visit by the doctors was 2mins 17secs and maximum time was 55mins 55secs. The results of this research study can be used to build and strengthen the care given by the health care professionals in order to give better patient outcome and to improve the quality of care of the organization. The results of this study will benefit in improving the time for initiation of treatment by health care professionals to patient admitted in emergency and ICU and also to improve the patient care.

Nursing implications
The investigator had drawn the following implications from the study which concern to the field of nursing practice, nursing education, nursing administration and nursing research.

Nursing practice
- The nursing personnel can incorporate the advancement in practices to improve the time in initiation of treatment to patient admitted to Emergency and ICU department by health care professionals.
- Incorporating new research findings related to initiation of treatment to achieve a better client outcome and improve the quality of care.

Nursing education
- Arrange trainings to nursing students regarding management of patient in Emergency and ICU department.

Nursing Administration
- The nurse administrator can take initiative in organizing in service and training programs to health care professionals to upgrade their knowledge on care of patient in emergency and ICU.
- Administrators can formulate policies regarding Care of patient in Emergency and ICU department.

Nursing research
- Suggestion and recommendation can be utilized by other investigators in conducting further study.

Limitations
- The researcher has found a limitation that during the observation of the sample, the 3 times observation was not confined only to stroke or head injury patient.

Recommendations
The present study recommends the following:
a. A similar study can be conducted on any patient admitted to Emergency or ICU department.
b. A descriptive study can be done to identify the factors in delaying of treatment in Emergency and ICU department.

Summary
This chapter deals with the summary of the research process, summary of main findings, limitation of the study, conclusion and implication of the study in nursing practice, education, administration and research. Study suggestions and recommendations for further study and improvement has also been incorporated in this chapter.

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