



**Effectiveness of Innovative Transitional Care Program in Improving Post
Discharged Outcomes Among Caregivers of Traumatic Brain Injury Survivors:
A Randomized Controlled Trial**

Amelia Ganefianty

**A Thesis Submitted in Fulfillment of the Requirements for the Degree of
Doctor of Philosophy in Nursing Science (International Program)**

Prince of Songkla University

2023

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I hereby certify that this work has not been accepted in substance for any other degree and is not currently submitted in candidature for any degree.

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ABSTRACT

Caring for patients with traumatic brain injury (TBI) during the transition period from hospital to home can cause psychological disturbances to caregivers. Nursing interventions to support these caregivers delivered before discharge and continuing into the community might improve their mental health outcomes. The study aimed to assess the effectiveness of an innovative transitional care program in improving post-discharge outcomes among caregivers of TBI survivors. A randomized controlled trial study was conducted. Random Allocation Software allocated 74 study participants to the intervention or control group. Then, 37 participants were included in the intervention group, while 37 were included in the control group. Outcomes were measured at 3-time points: at hospital discharge (T0), two (T1) and four (T2) weeks post-discharge. The intervention instrument was an innovative transitional care program. Another two instruments, including Caregiver Stress Self-Assessment and Zarit Burden Interview, were used for data collection. The corrected item-total correlation of Caregiver Stress Self-Assessment ranges from .77 to .95, with the Cronbach's alpha value of .91. In comparison, the range of the corrected item-total

correlation of the Short-Zarit Burden Interview from .69 to .93, with Cronbach's alpha value of 0.88. Data were analyzed using repeated-measure ANOVA.

The findings showed that stress within the intervention group decreased over time ($p < .001$, MD = 11.05). Both groups' stress was significantly different at T1 and T2 ($p < .001$). The caregiver burden showed similar results (T1 $p < .001$ and T2 $p < .001$). Only one patient in the control group was readmitted to the hospital, while no patients were readmitted in the intervention group. The innovative transitional care intervention reduced the stress and burden of caregivers of patients with moderate or severe TBI. Nurses must consider using mobile application to support caregivers from the hospital into the community.

Keywords: Brain injuries; Caregivers; Caregiver burden; Stress; Telehealth; Transitional care.

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CHAPTER 1

INTRODUCTION

1.1 Background and significance of the problem

Traumatic Brain Injury (TBI) is a significant health concern that might cause disability as well as social and economic challenges among these patients (Savitsky et al., 2016). Approximately 69 million people are estimated to experience TBI every year, with various causes (Dewan et al., 2019). Indonesia, as an LMIC, has reported a high incidence of TBI. A total of 1,290 people experienced TBI and were admitted to the neurosurgery unit at Hasan Sadikin Hospital, the Referral Hospital of West Java Province, Indonesia, in 2017 and increased to 1460 people in 2018 (Faried et al., 2017). Based on statistical data on the classification of TBI, in each of these years, there were 59-60% of cases of mild head injury, 25-27% of cases of moderate head injury, and 14-15% of cases of severe head injury (Medical Record Data Hasan Sadikin Hospital, 2018).

TBI in low-middle income countries (LMICs) in particular has a greater significant effect than those in high-income countries (Iaccarino et al., 2018). WHO estimates that nearly 90% of injury deaths occur in LMICs, and TBI is the leading cause of one-third to one-half of these trauma-related deaths. Moreover, it is the most significant cause of death and disability globally among all trauma-related injuries. This is possible due to the distinctions in health services, delayed treatment (Gupta et al., 2020) as well as lack of inadequate support during the transitional period (Defillo, 2011).

Continuity of care in TBI survivors and caregivers needs particular attention, especially in LMICs. The transitional care program for TBI survivors and caregivers at LMIC is still being developed. For example, the government has not adequately diverted resources toward preventing, managing, and rehabilitating TBI in LMICs such as India (Agrawal et al., 2015). Moreover, patients discharged obliviously are undeniably challenging to treat at home and are inclined to pressure ulcers, respiratory diseases, scanty sustenance, and physiotherapy. In Indonesia, there is no transitional care program between hospital and home among TBI survivors and their caregivers.

TBI survivors can experience a wide variety impact due to neurological deficits (Blennow et al., 2016). The physical impact caused by TBI can interfere with the fulfillment of patients' daily needs, such as the need to eat, dress, bathe, or mobilize because of the symptoms. Patients can encounter headaches, vision loss, loss of capacity to walk, mental weakness, cognitive decline, and different circumstances that outcome from harm to the piece of the brain because of TBI. These handicap conditions can go on after the patient's release from the medical clinic and are related with critical constraints in different parts of regular daily existence (Alghnam et al., 2017), such as psychological and cognitive impairment, and decreased social functioning (Semple et al., 2019).

The diversity and complexity of problems and needs suggest the high demands of care for TBI survivors especially during the transition to home to lead satisfying lives regardless of the consequences of brain injury (Stiekema et al., 2020). TBI survivors need the caregiver to assist them in the schedule and type of medication to be consumed, provision of food, social security, and access to health services (Dillahunt-Aspillaga et al, 2013). Several tasks were taken including fulfilling daily living activities, assisting

in mobilization and medication, and overcoming other problems experienced by patients, such as psychological, social, and cognitive problems (Karpa et al., 2020). Moreover, caregivers have another essential role provide mental and emotional support to TBI survivors in facing changes in all aspects of life (Fleming et al., 2012).

Caregivers play a role when TBI survivors are admitted to the hospital, up to treatment at home in the transition phase. In hospitals, caregivers assist nurses in meeting the needs of patients' daily living activities, such as mobilization and personal hygiene, intending to prepare caregivers to treat patients at home. These conditions can certainly affect the burden experienced by caregivers. The result of the study showed that the caregivers of TBI survivors who were hospitalized and helped treat patients had a higher burden (Cruz et al., 2019). A review of studies in Indonesia and LMIC, has revealed that most caregivers do not feel confidence or are ready to care for TBI survivors at home, and need to gain more support in transition period (Hassan et al., 2011; Mcallister et al., 2017; Karthigeyan et al., 2021).

Caring for someone with moderate to severe level of TBI has been shown of negatively impact on caregivers particularly in transition period from hospital to home regarded as a critical period for TBI care. The conditions that occur in caregivers of moderate to severe TBI survivors require more TBI care and support systems which integrate essential services to reduce morbidity and mortality rates and the incalculable human suffering that result from neurotraumatic events with appalling sequelae (Caro, 2011). Most caregivers for moderate and severe TBI survivors reported high levels of stress and burden when caring for TBI survivors at home (Lieshout et al., 2020a). Another study also mentioned that the moderate and severe TBI caregivers experienced less satisfaction to support successful discharge because the significant barriers to

health services for TBI survivors at different points in the care continuum. (Eliacin et al., 2018).

Stress conditions during the transition period related to the most caregivers depicted the subsequent temporary experience as full of dangers and misery since they felt deficient, reluctant, or insufficiently prepared to carry out medication anticipate patients (Mitchell et al., 2018). In addition, barriers or difficulties have been found among caregivers after discharge, including less confidence in providing care without support at home and poor availability of resources and time for consultation with the healthcare provider (Siripituphum et al., 2020). Previous studies have explained that stress on caregivers of TBI survivors is caused by the inability to care for patients at home such as wound care and provide nutrition, it can result in the patients they are caring for will not survive, difficulties in obtaining accurate information about the relative prognosis that has a permanently life-changing effect and problems adapting to the environment circumstances change after the patient with TBI returns home (Blake, 2008, 2017; Schlebusch & Walker, 2020). Proper caregiver education earlier than discharging the TBI survivors from the health center, would lessen the opportunities of psychological signs and symptoms performing within the caregivers inside the future (Qadeer et al., 2017).

As for caregiver burden, the literature explains that the most substantial predictive factors that cause burden include lack of a social network, feeling lonely, and patient's functional status (Caplan et al., 2015). Furthermore, a study explains that caregivers with limited support will be challenged to have more physical and mental health burdens (Azman, Jali, Singh, Singh, & Ibrahim, 2019). However, therapeutic intervention in problem-solving coaching embodies proper caregiver education before

the discharge of TBI survivors from the hospital, which can cut back the chance of developing psychological symptoms of caregivers in the future (Qadeer et al., 2017).

The caregivers are therefore expected to have qualified knowledge and skills as an extension of the nurse's hand in caring for TBI survivors after discharge from the hospital. The previous study showed that caregivers of TBI survivors need information from the various parties (Othman et al., 2021). The participants lack information on specific care techniques for severe TBI patients, such as enteral feeding, wound care, and knowing the emergency signs of patients. When caring for TBI survivors at home, caregivers also play a role in preventing patient's readmissions. Hospital readmission is common for patients discharged after TBI (Brito et al., 2019). Forty percent of readmissions occurred within the first 30 days after discharge from the admission, with the majority reason for septicemia, urinary tract or wound infection, and aspiration (Brito et al., 2019). From data obtained from the Neurosurgery Unit of Hasan Sadikin Hospital, seven and eight patients with moderate and severe TBI underwent readmission in 2017 and 2018 with various conditions, including infection, wound dehiscence, and decreased consciousness.

To reduce stress transition, caregiver burden, and prevent hospital readmission, it is necessary requires intervention in the form of therapeutic intervention in problem-solving coaching and embodying proper caregiver education before the discharge of TBI survivors from the hospital, which can cut back the chance of developing psychological symptoms in caregivers in the future (Qadeer et al., 2017). In addition, providing information about TBI survivors will help reduce tension and stress in caring for patients (Blake, 2008). Also, the education and training of caregivers through demonstrations were essential to reduce caregiver burden and prevent complications in

TBI survivors after discharge from the hospital (Verma et al., 2018). The other literature describes that the health literacy education intervention can help mitigate 30-day readmission for TBI survivors (Pollifrone et al., 2021).

Post-hospital care outcomes, including the recovery and preventing complications in TBI survivors, are closely related to the discharge planning process carried out by nurses (Andrew et al., 2018). Hasan Sadikin Hospital has guidelines regarding discharge planning for patients that nurses must implement that aim to prepare patients for their health conditions after being treated at the hospital (Hasan Sadikin Hospital Archives, 2018). However, currently available nursing interventions in hospitals only focus on patients with all levels of TBI, except for caregivers.

Telehealth can significantly effective to provide services to both outpatients and in facilities in TBI cases (Malec et al., 2021). Likewise, for caregivers, a systematic review explains that internet-based interventions that combine professional and social support and provide instruction for behavior change and interactive problem solving appear to lead to positive outcomes in caregivers (Guay et al., 2017; Coxe et al., 2020). However, there are some gaps in implementing the existing telehealth or m-health programs related to imposing readiness for hospital discharge, reducing stress and burden of caregivers, and reducing hospital readmission of TBI survivors, primarily if these programs are implemented in LMIC. The majority of all existing programs was implemented in high-income countries. Also, a study was conducted by involving caregivers with a high level of education (Caplan et al., 2016). However, only 8.5 percent of Indonesia's population managed to graduate from higher education of this large number (Central Bureau of Statistics, 2020) which reflected the needs of further upskill using various sources.

M-Health has become one of the main general well-being mediation apparatuses in created nations and is quickly adjusting to numerous general well-being programs at LMIC (Kazi et al., 2021). Utilizing a phone-based mediation, joining individualized instruction, and coaching critical thinking can loosen organizations to individuals with transportation or other access impediments (Caplan et al., 2016). However, it could be more practical than giving face-to-face benefits (Caplan et al., 2016). This result is in line with the study in Indonesia that it is attainable to direct subsequent phone conferences and meetings with patients with mild and their caregivers for moderate and severe TBI after discharge from a neurosurgical ward at 1, 2, and 3 months post-release and that patients and their caregivers valued such follow-up (Sutiono et al., 2017). Currently, 88% of Indonesians are Android users, while the rest are IOS users (Abdillah, 2019).

Due to limited study on TBI care after discharge in Indonesia, a previous study in stroke patients was reviewed to reflect on the effectiveness of transitional care programs. The results showed that nursing therapy programs to facilitate patient transitions affect the subjective well-being, role mastery, and well-being of adult patients with stroke in Indonesia (Kosasih et al., 2020). This is undoubtedly a challenge and opportunity for nurses in Indonesia to build a transitional care program in the care of moderate and severe of TBI survivors which have more complex problems prior and post discharge. This study tests the effectiveness of the innovative transitional care program in improving stress transition and the caregiver burden and readmission of patients of TBI in Indonesia.

1.2 Objectives of research

1.2.1 General objective

The aim of the study was to investigate the effectiveness of innovative transitional care program on response patterns (stress transition and the burden of caregiving) among caregivers of TBI survivors as well as patients' readmission rate at one month after hospital discharge.

1.2.2 Specific objectives

1.2.2.1 Compare the stress transition and burden of caregivers of TBI survivors within groups at discharge, two-weeks, and one month after discharge.

1.2.2.2 Compare the stress transition and burden of caregivers of TBI survivors between groups at discharge, two-weeks, and one month after discharge.

1.2.2.3 Compare patients' readmission rate at one month after hospital discharge between the control and experiment groups.

1.3 Research hypothesis

1.3.1 The stress transition and burden of caregivers of TBI survivors in the experiment group receiving the innovative transitional care program would be lower than before the intervention.

1.3.2 The stress transition and burden of caregivers of TBI survivors in the experiment group receiving the innovative transitional care program, would be lower than the control group.

1.3.3 The readmission rate of TBI survivors in the experiment group, would be lower than the control group.

1.4 Conceptual framework

This study investigates the effectiveness of the innovative transition care program in improving post discharged outcomes among caregivers of patients with moderate and severe of TBI in Indonesia. This study was informed by Meleis' transitional theory. Thus, the conceptual model theory in developing programs and achieving the expected outcomes. Transitional care is a set of measures designed to ensure comprehensive coordination and continuity and the availability of a trained practitioner who has up-to-date information on the patient's treatment goals, preferences, and health status (Meleis, 2010).

Patients and their caregivers should receive transitional care from health professionals before returning home. Transitional care comprising therapeutic nursing (Meleis, 2010) involves three interrelated concepts: assessment of readiness, preparation for the transition, and role supplementation. First, the nurse can identify the patient's health needs and problems during the transition phase. The next stage is preparation for transition. Next, the nurse can create optimal conditions for applying new knowledge and skills through education and coaching. The final stage is role supplementation, a transitional model used to improve the quality of care for people discharged from the hospital. At this stage, patients and caregivers can participate in goals and how to optimize their health. Nurses can assess the readiness of patients and caregivers, prepare them and their environment, and select appropriate interventions to enhance their understanding and skills. The results of the intervention achieved will be

evidenced by the achievement of understanding the skills of patients and their caregivers in obtaining readiness to go home, reducing response patterns (stress transition and the burden of caregiving), reducing the number of readmissions.

There are two significant parts to transition theory (Meleis, 2010). The first is associate intervention created by a nurse to facilitate the transition and promote well-being and mastery of the changes that result from the transition. This includes conceptually providing support through vital others, and a care team of advanced observe nurses. Through home visits and phone conferences, the care team tries to clarify what the person in transition could also be looking and can bear throughout the transition to recovery; the team then provides information, skills, strategies, self-care, and psychosocial competencies to assist the person cope with the transition expertise. The second most vital part of transition theory is knowing the transition expertise, which is outlined because of the expertise of losses and gains, changes and transformations, and a passage from one state to a different.

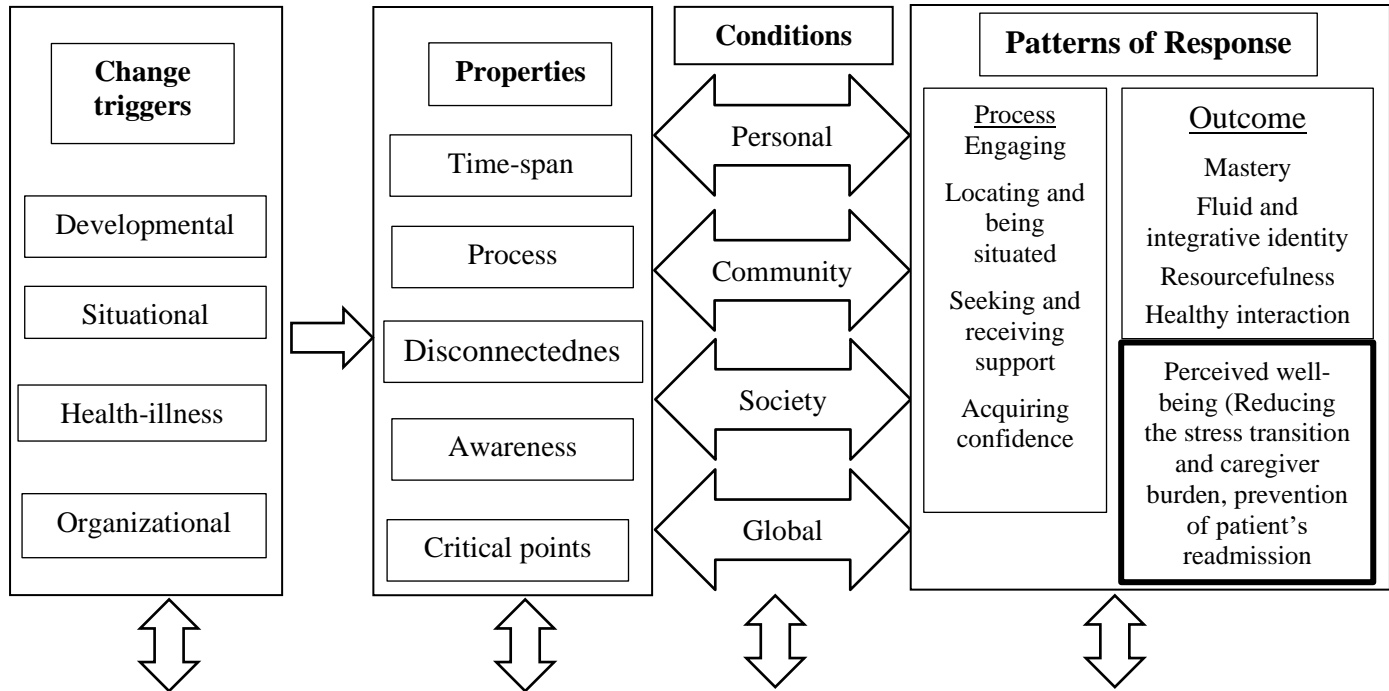
This study focused on caregivers of patients with moderate and severe TBI. TBI causes numerous critical problems. After TBI, patients will experience various disorders in physiological, psychological, and social aspects. In the majority, TBI survivors will experience impaired mobilization, impaired fulfillment of daily living activities, memory problems, vision problems, and headaches (Alghnam et al., 2017). In addition, the conditions experienced by these patients can cause psychological and social disorders, such as anxiety, stress, depression, social issues, and work disorders (Semple et al., 2019). These disturbances can continue during the transition from hospital to home. Of course, TBI survivors need companions who help them in

overcoming their problems, namely caregivers. Caregivers must help TBI survivors meet their needs and overcome their difficulties in the transition period.

Transitioning TBI survivors from hospital to home is a health-illness event from nursing interventions to caregiver interventions. This condition requires additional attention from nurses to optimize the patient's well-being. The transition from hospital to home is crucial for TBI survivors and their caregivers. TBI survivors are discharged home with additional deficits, imposing a critical care burden on family caregivers while limiting caregiver preparation and coaching (Imanigoghary et al., 2017). Based on the systematic review and meta-analysis, education, skill-building, and psychological support interventions should receive the most significant consideration by nurses to implement transitional care interventions between hospital and home for TBI survivors and their caregivers (Ganefianty et al., 2021).

The innovative transitional care program plays a role in improving patient care in the transition period from hospital to home and reducing the prevalence of preventable disease complications. Information and communication available to caregivers in TBI survivors through the innovative transitional care program are targeted, relevant, and supported during all care stages, especially in the transition period. This education and personalization results in higher engagement, better patient outcomes, and lower readmission rates. The following is a research conceptual framework based on the transitional theory model from Meleis (see Figure 1).

Figure 1 Conceptual framework



Nursing Therapeutic			
H O S P I T A L	Assesment of readiness	Providing education and information	
	<ul style="list-style-type: none"> Physical ability for care the TBI survivors. Adequate support for care after hospital discharge Emotional stability of caregivers Sufficient information and knowledge to answer common problems 	<ul style="list-style-type: none"> How to treat TBI survivors at home, which includes wound care and how to provide nutrition Recognize signs of infection in wounds of craniotomy Recognize emergencies in cases of TBI patients at home Stress management How to arrange a schedule for the care of TBI survivors at home 	
	Role supplementation of nurse		
	<ul style="list-style-type: none"> Provide information and skill during discharge Preparing caregivers to manage the patient with TBI Empower caregivers through clarity, knowledge, skill, and resources Counseling the problems of caregiver Support to help caregivers manage wound and nutrition Facilitate consultation with neurosurgeon when there are medical problems of TBI survivors 		
H O M E	Monitoring and follow-up		
	Coordination with nurses at the Community Health Center around the patient's residence		
	Caregiver's domain	Patient's domain	
	<ul style="list-style-type: none"> Stress transition Caregiver burden 	<ul style="list-style-type: none"> Sign and symptoms Patient's readmission 	

Resources: (Ganefianty et al., 2021; Meleis., 2010)

1.5 Definition of terms

The innovative transitional care program is an innovative program for caregivers of patients with moderate or severe TBI. This program consists of education and providing face-to-face information assisted by an android-based application that can access via a smartphone, skill demonstration, assessment of the readiness of hospital discharge, as well as weekly monitoring and follow-up after the patient is discharged from the hospital. This application provides education and information on caregivers of TBI survivors regarding (a) how to treat TBI survivors at home, which includes wound care and how to provide nutrition, (b) recognize signs of infection in wounds of craniotomy, (c) recognize emergencies in cases of TBI survivors at home, (d) stress management, and (e) how to arrange a schedule for the care of TBI survivors at home. This program complements routine care, which consists of education about physical health and TBI medical problems, and how to treat TBI survivors at home.

Stress transition is defined as a demand in which caregivers of TBI survivors do not have automatic adaptive responses when facing phases of care for TBI survivors in different settings, from hospital to home. The stress transition questionnaire used the Caregiver Stress Self-Assessment from Dr. Steven Zarit, a modified version containing a list of 20 statements that reflect how people sometimes feel when taking care of another person (Zarit et al., 2001).

Caregiver burden is defined as the level of multifaceted tension felt by caregivers caring for TBI survivors at home after discharge from the hospital, related to caregiver health, psychological well-being, finances, social presence, and relationships between caregivers and patients. The Short- Zarit Burden Interview (ZBI),

a 12-item instrument has been used to measure the caregiver's perceived burden of providing family care, including the awareness on central regions inclusive of the caregiver's health, psychological well-being, finances, social existence, and the relationship between the caregiver and the patient (Hebert et al., 2000).

Readmission rate refers to the subsequent inpatient admission of a patient with TBI to an acute care facility within 30 days after discharge of the date of discharge from the hospital (Bailey et al., 2019).

Routine care program refers to the usual care by nurses for the caregivers of TBI survivors in the ward before discharge from the hospital. The program consists of education about physical health and TBI medical problems, and how to treat TBI survivors at home. This includes wound care education, medication administration, and schedule control to the hospital after TBI survivors go home. After discharge, there is no program carried out by nurses.

1.6 Scope of the study

This study covers the transition period of TBI survivors from hospital to home. The innovative transitional care program consists of education and providing face-to-face information assisted by an android-based application that can be accessed via a smartphone, skill demonstration, assessment of the readiness of hospital discharge, and weekly monitoring and follow-up after the patient is discharged from the hospital. This program complements routine care, starting when the patients are treated in the hospital and finishing one month after hospital discharge from Tertiary Hospital in Indonesia from January to June 2023. The outcomes include stress transition and caregiver burden

assessed at discharge, two weeks after discharge, and one month after discharge, and readmission of the TBI survivors within one month after discharge.

1.7 Significance of the study

The results of this study are the basis for developing nursing interventions in the form of transitional care programs for caregivers of TBI survivors. The innovative transitional care program would help improve stress transition and the caregiver burden among caregivers of TBI survivors. These results also can minimize the number of hospital readmissions in TBI survivors after treatment from the hospital.

The innovative transitional care program can be used in nursing practice in hospitals to prepare caregivers to care for patients with moderate and severe TBI during the transition from hospital to home. This program can be used as a hospital standard operating procedure to improve patient care outcomes with TBI. More broadly, this program can become a policy from the Indonesian Ministry of Health to be applied to vertical hospitals that have similar characteristics to Hasan Sadikin Hospital.

Also, materials regarding transitional care for TBI survivors and their caregivers have yet to be made into teaching materials in nursing education institutions in Indonesia. Thus, it will benefit the nursing education institution to add the nursing student's exposure to transitional care between hospital and home.

CHAPTER 2

LITERATURE REVIEW

This chapter discussed the literature in support of the m-health supportive care transition program in improving post discharged outcomes among caregivers of TBI survivors in a randomized controlled trial. A literature review is an iterative review discussing published information in a particular subject area (Knopf, 2009). This is made to analyze a problem contained in a study. This chapter discusses the theoretical review of:

2.1 Overview of TBI survivors

2.2 Problems and caregiving demand of caregivers of TBI survivors

2.3 Theory of transitional care and its application

2.3.1 Concept and theories of transitional care

2.3.2 Health policies related to transitional care

2.3.3 Transitional care for TBI survivors and caregivers in LMIC

2.4 Readiness for hospital discharge

2.5 Stress transition

2.5.1 Concept of stress transition

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2.8 Summary of literature review

2.1 Overview of TBI survivors

TBI is damage to the head (not congenital or degenerative). It is caused by an external physical attack/impact, which can cause damage to cognitive abilities and physical function (Tsao, 2020). TBI is characterized as non-degenerative and noncongenital anomalies that happen in the brain because of outer mechanical powers, which are in danger of causing a transitory or extremely durable aggravation in mental, physical, and psychosocial work, joined by a diminished or loss of awareness (Menon et al, 2010). For example, it can be caused by falls, motor vehicle accidents, sports accidents, violent injuries, and being shot or stabbed. Several symptoms often accompany TBI. They include actual side effects, for example, migraine, weariness, balance issues, and tactile side effects, like obscured vision or light responsiveness. Cognitive and emotional/behavioral symptoms may include memory or feelings of anxiety or depression, individually (Tsao, 2020).

Symptoms that occur in TBI survivors can continue even after the patient has finished hospitalization especially for moderate and severe of TBI, including long-term neurocognitive disability, neurobehavioral sequelae, somatic disorders, cognitive disturbances, neuroendocrine dysfunctions, and mental disorders (Pieter, 2018). For example, the results of a study at the TBI survivors in the referral hospital in West Java, Indonesia, showed that there were still many TBI survivors experiencing problems in the quality of life components, including headaches, impaired mobility, impaired meeting daily needs, as well as psychological disorders such as anxiety and stress in one month after the patient was discharged from the hospital (Mcallister et al., 2017). This condition implies that TBI survivors require care from post-hospital care nurses.

Classification of head injury is the type of head injury grouped by severity through the Glasgow Coma Scale (GCS) examination. For example, mild head injury is classified if the GCS score is 13-15, moderate head injury is 9-12. In comparison, severe head injury has a GCS value of less than or equal to 8. Brain damage in head injuries can be caused by primary (direct) and secondary head injuries that occur due to various pathological processes that arise as an advanced stage of primary brain damage, in the form of bleeding, edema brain, sustained neuronal damage, ischemia, increased intracranial pressure and neurochemical changes (Pieter, 2018).

Surgical treatment is generally performed in head injury patients with acute extra-axial hematomas subdural and epidural bleeding. Several small-scale studies have reported that burr hole creation for the initial management of extra-axial hematomas may benefit traumatic brain injury patients. Decompressive craniotomy is a surgical procedure that opens a fairly large area of the skull. A craniotomy reduces intracranial pressure by providing extra space in the swollen brain and can quickly prevent

brainstem herniation. Research shows that craniectomy is a procedure that can be performed as a life-saving procedure; however, the possibility of severe disfigurement looms for those who undergo this procedure (Pieter, 2018).

2.2 Problems and caregiving demand of caregivers of TBI survivors

An expert defines a caregiver as an individual who generally cares for and supports other individuals (patients) in their lives (Bastawrous, 2013). TBI survivors, for the most part, require assistance, supervision, or other forms of care after hospitalization, even months or years after the injury (Powell et al., 2016). This condition makes the caregiver's role very important in the care of TBI survivors at home. The caregiver's responsibilities can include various activities such as providing direct personal care to the patient (for example, dressing or bathing assistance), assisting or taking responsibility for tasks that require memory and executive functions (e.g., coordinating appointments and managing finances), providing instrumental aid (e.g., meal preparation and transportation), managing emotional and behavioral problems that interfere with daily life, and assisting patients in accessing healthcare services (Powell et al., 2016).

In particular, the results of previous studies have consistently reported the consequences of caring for TBI survivors in the family are primarily negative; with prolonged exposure to stress and tension and its harmful effects on the social, emotional, structural, and financial functioning of the family; role change; and challenges to caregivers' core values and resources (Karpa et al., 2020). In addition, the results showed that of the fifty caregivers of TBI survivors, the most experienced moderate to severe caregiver burden (Devi et al., 2020). On the other hand, the problems

experienced by caregivers of TBI survivors show a significant relationship with quality of life, care for patients, anxiety, and depression which can affect the quality of care at home after discharge from the hospital (Bermejo-Toro et al., 2020). A caregiver is characterized as a neglected person who gives care administration to individuals who can't sufficiently focus on themselves (Alliance, 2012). Caregivers and families play a significant, widely inclusive job in the restoration cycle of TBI survivors. Unfortunately, this role is often accompanied by an overwhelming sense of stress that the individual experiences with TBI and their entire family (Vangel et al., 2011).

Treatment of TBI survivors should be comprehensive and long-term care from when the patient is treated until he returns home. For this reason, the problems and needs of caregivers for TBI survivors must be a severe concern for nurses. The issues faced by caregivers of TBI survivors have been described in outline in the previous section. Regarding needs, an article discusses caregiver needs for TBI survivors after the patient returns from hospital care, including information needs, support, relationship with the health care team, and maintenance of services (Lefebvre & Levert, 2012). Data needs remember data for sequelae and long impacts, assets and backing administrations for social and expert reintegration, and their privileges. Concerning help needs, the caregivers figures need backing and socialization, the presence of loved ones advancing social investment during the get back, and admittance to mental help, long follow-up, and peer support administrations.

Research assessing the long-term family needs of caregivers of TBI survivors shows that many requirements, including information and support, are often judged to be unmet (Dillahunt-Aspillaga et al., 2013). Also, caregiver of TBI survivors needs stage of recovery (from acute care to long-term living in the community), financial

advice and assistance, health and rehabilitation information, emotional and social support change over time and reflect the setting of care, level of functioning, and the patient's function (Dillahunt-Aspillaga et al., 2013). Other literature explains that the needs of caregivers of TBI survivors are related variables to caregiver mental health, and household needs are uniquely associated with caregiver anxiety, burden, and depression. In addition, the need for social support is uniquely related to caregiver satisfaction with life, information need for burdening, and financial need for self-esteem (Leibach et al., 2014).

A systematic review also discusses the caregiver needs of TBI survivors on nurses as health care providers. These needs are divided into three main categories: informational, emotional, and practical support needs (Coco et al., 2011). Subcategories of information support needs are information about the patient's symptoms, treatment, quality of information, and prognosis. The subcategory of emotional support needs is to consider emotions, care, listening, and respect. Meanwhile, the subcategory of practical support needs supports in decision making, improving family welfare, encouraging family members to participate in care, cooperation with family members, and counseling services. The review suggests that nurses can support the families of TBI survivors from various dimensions (Coco et al., 2011).

Recent study results illustrate that TBI survivors and their caregivers need additional support and education from acute hospital to home care. The findings can improve education and support from providers and health systems provided to TBI survivors and their caregivers to inform the development and testing of transitional care interventions from acute hospital to home care (Potter et al., 2017). A wide range of interventions used in improving the outcomes among TBI survivors and their

caregivers, including education (Caplan et al., 2016; Kelly et al., 2013; Kreutzer et al., 2018; Trexler et al., 2010; Winter et al., 2016) and home community-based rehabilitation (Altman et al., 2010; Winter et al., 2016).

Conditions that occur after the transition from hospital to home are a burden and psychological problems for caregivers. A study showed that as many as 59% of caregivers of TBI survivors experienced a caregiver burden and a large number in mental health (75%) (Bermejo-Toro et al., 2020). Therefore, a wide range of interventions is used in improving the outcomes among TBI survivors and their caregivers. The main finished between one to three month period includes the education (Caplan et al., 2016; Kelly et al., 2013; Kreutzer et al., 2018; Trexler et al., 2010; Winter et al., 2016) and home community-based rehabilitation (Altman et al., 2010; Winter et al., 2016). Patient education was delivered after discharge by face-to-face visits, telephone, group education, and in-person education (both patient and caregiver) education (Bushnik et al., 2015; Caplan et al., 2016; Kelly et al., 2013; Kreutzer et al., 2018; Moriarty et al., 2016; Trexler et al., 2010), while home community-based rehabilitation refers to home visits by a doctor, nurse, or occupational therapist, who educate and give the self-care instructions, undertake the physical examination, and provide care rehabilitation (Altman et al., 2010; Winter et al., 2016).

Previous research has explained that caregivers of TBI survivors require the ability to care for patients at home, such as wound care and providing nutrition, making TBI survivors survive and not experience complications (Blake, 2008, 2017; Schlebusch & Walker, 2020). TBI-related caregiving needs, Griffin and colleagues found that caregivers may need to learn nursing activities, such as tube feedings, tracheostomy and stoma care, catheter care, wound care, and medication

administration. In addition, the stress in caregiving may interfere with understanding information related to the care receivers' medical care and may require multiple formats to explain care needs (Martin & Langbein, 2017).

In addition, the caregivers' tasks involve attending to the patients' daily activities, such as bathing: grooming, and feeding, as well as changing patient position, body exercise movements for prevention of other complications, and close observation to detect (some alert) symptoms to avoid risk and accidents (Harisson et al., 2017). However, the caregivers were too shy, too considerate, or too insecure to communicate with the nursing staff. They were afraid of disturbing the nurses when they were working. Most caregivers, therefore, acquired knowledge and skills for TBI care by self-learning, experience in caregiving, observation of healthcare personnel, and other caregivers' practice (Siripituphum et al., 2020). Also, caregivers of patients with caregivers reflected their need for information and support at home and the current technology used for care at home. The results also identified the problems in the early period, after being discharged home, due to the TBI patient's disability, which causes limitations in performing the fundamental activities of daily life. Ineffective caregiving, less confidence, or an inability to carry out caregiving tasks, in turn, affects the patient's health status and disability rehabilitation (Siripituphum et al., 2020).

Moreover, during the rehabilitation phase, caregivers are responsible for fulfilling the additional roles of unconscious survivors. Caregivers of TBI survivors have unique needs because ailments are always a sudden event. Caregivers shared several of their unfulfilled needs concerning support. The results showed that caregivers of TBI survivors need support and information for care. The results also showed that caregivers need information from the various parties (Othman et al., 2021). The

participants lack information on specific care techniques for severe TBI patients, such as enteral feeding, wound care, and knowing the emergency signs of patients. Furthermore, additional strain due to the pandemic cause caregivers to face extra challenges. Caregivers living with TBI survivors are finding new ways of adapting to the present context, which causes changes in the social and health care conditions (Othman et al., 2021).

2.3 Theory of transitional care and its application

2.3.1 Concept and theories of transitional care

Transitional care is the care of clients or patients from one place to another with different settings or from hospital to home (Naylor & Keating, 2017). Transitional care is a set of measures designed to ensure comprehensive coordination and continuity and the availability of a trained practitioner who has up-to-date information on the patient's treatment goals, preferences, and health status (Meleis, 2010). Patients and their caregivers should receive transitional care from health professionals before returning home. There are two significant parts to transition theory (Meleis, 2010). The first is an intervention made by a nurse to facilitate the transition and promote well-being and mastery of the changes that result from the transition. This includes conceptually providing support through significant others and a care team of advanced practice nurses. Through home visits and telephone conferences, the care team attempts to clarify what the person in transition may be going through and will go through during the transition to recovery; the team then provides knowledge, skills, strategies, self-care, and psychosocial competencies to help the person deal with the transition experience.

The second most significant piece of progress hypothesis is understanding the change experience itself, characterized as the experience of misfortunes and gains, changes and changes, and an entry starting with one state then onto the next. Nonetheless, these encounters are not set in stone by whether the progress results from the typical turn of events, changes in wellbeing and disease, intense or ongoing determinations, going in or out of medical clinics, separate, or hierarchical changes. The experience is likewise intervened by whether the individual is going through single or numerous advances, the importance of the shift to the individual going through it, and what else is happening in the individual's life. Many conditions exacerbate or alleviate responses to these personal, immediate family, community, or societal transitions. Healthy transitions are not only judged by the outcome, such as mastery of roles, a sense of well-being, or well-being of relationships; they are also predicated on whether the processes themselves were healthy or unhealthy.

The central concepts of middle-range transition theory include (a) types and patterns of transitions; (b) transition experience properties; (c) transitional conditions (facilitators and inhibitors); (d) process indicators; (e) outcome indicators; and (f) therapeutic nursing (Meleis, 2010). Transition types include developmental, health and illness, situational and organizational. Developmental changes include birth, adolescence, menopause, the aging process (senescence), and death. The transition to health and illness consists of the healing process, discharge from the hospital, and chronic diseases. The transition from a healthy state to a sick state differs from the transition caused by a natural behavior change process. Organizational transition refers to changes in environmental conditions that affect clients' lives and changes in the status of employees owned. Transition patterns include diversity and complexity. Most people

experience various kinds of transitions simultaneously and not just one transition that is not easily distinguished from the context of their daily life.

The transition experience properties include (a) awareness; (b) engagement; (c) change and difference; (d) periods; (e) critical point and incident point. Awareness is described as the perception, knowledge, and recognition of the transition experience. The level of awareness is often reflected in the degree of correspondence between the process and response and what underlies an expected reaction and an individual's perception of undergoing the same transition. Meleis (2010) states that engagement is another aspect of the transition. Engagement describes the individual's level of involvement in the transition process. Meleis (2010) noted that the level of engagement of someone aware of physical, emotional, social, or environmental conditions would differ from someone who is not aware of these changes. Change and difference are aspects of transition. Changes in identity, roles, relationships, abilities, and behavior patterns are expected to lead to changes in internal processes and external processes. Time Span is a transition aspect, identified from the start, the shift from the initial sign of anticipation, perception, or demonstration of change; movement through periods of instability, confusion, and distress toward the actual end. Critical points and events are the last aspects of the transition described as markers such as birth, death, and diagnosis of a disease.

Transitional conditions are states that affect the way a person goes through a transition process. These transitional conditions include personal, community, or social factors that may facilitate or hinder the transition and healthy outcomes. Individual conditions have meanings, cultural beliefs and attitudes, socioeconomic status,

preparation, and knowledge. Community conditions (e.g., community resources) or social conditions can be facilitators and barriers to the transition process (Meleis, 2010).

Response patterns are defined as process indicators and outcome indicators that characterize a healthy response. Hands of the process move the client in a healthy direction that the nurse facilitates in promoting the change. Outcome indicators are used to assess whether the transition is a healthy process or not. Process indicators include feeling connected, interacting, getting used to, and developing self-confidence and coping. Some hands of a healthy transition are subjective well-being, mastery of new behaviors, and interpersonal well-being (Meleis, 2010). Emotional well-being in the transition process includes effective coping and managing emotions and feelings of dignity, personal integrity, and quality of life (Meleis, 2010). Mastery has several components, including abilities/competencies that bring knowledge or cognitive skills, decision-making, psychomotor skills, and self-confidence (Meleis, 2010). Mastery indicates a successful transition process at the organizational and individual levels (Meleis, 2010). Mastery is an indication of a successful transition process at the organizational and individual levels (Meleis, 2010). Well-being in a relationship/relationship. Well-being is one's relationship suggests that the transition process has been successful. Relationship well-being is defined as family adaptation.

Meleis (2010) describes therapeutic nursing as readiness assessment, transition preparation suggested by the therapeutic nursing process, and the role of therapeutic nursing supplementation. Readiness assessments need to be multidisciplinary and require an understanding of the patient. A readiness assessment includes each of the conditions identified in generating a profile of individual readiness and identifying various patterns of transition (Meleis, 2010). Education is the principal

capital in creating optimal conditions in preparation for the transition (Meleis, 2010). This is because education can increase the development of the necessary skills. The last therapeutic nursing is role supplementation.

2.3.2 Health policies related to transitional care

Globally, health policies related to transitional care are regulated by the World Health Organization (WHO). WHO explains the policy regarding the transition of care in the Technical Series on Safer Primary Care (2016). In the policy, it is stated that "The patient's journey through the health care system can involve a number of interfaces between primary, community and hospital care. The constant in these transitions is the patient, and their families and carers. Thus, it is imperative that the patient's role and responsibilities are considered central to any strategies that support safe and effective transitions of care. Transitions of care are an integral part of patient care, and it requires sufficient resources to ensure effective care transition and coordination." The policy also states that there is no easy solution to provide a safer transition to care. Different methodologies are required. Both enormous and limited scope mediations have been tried at the full scale (medical care framework), meso (medical care association), and miniature (administration conveyance) levels. The objective gatherings for these potential arrangements change and incorporate individuals inside explicit geographic regions, individuals with specific diseases or incapacities, and individuals with exceptional consideration needs.

The authorities are answerable for the supply of the surroundings, order, health centers, both bodily and social for the community to obtain the very best diploma of

fitness (Law of the Republic of Indonesia Number 36, 2009). This law guarantees health insurance for every citizen. Following Indonesian Minister of Health Regulation No. 378/2008, medical rehabilitation or intermediate care is defined in Indonesia as a service that aims to restore or improve patients' physical and functional abilities from disabilities due to illness. Medical rehabilitation services commonly available in Indonesia include physiotherapy, occupational therapy, speech therapy, and orthotics/prosthetics. These services are offered more comprehensively by hospitals, health centers, community-based rehabilitation practices, or stand-alone private practices. These services vary across the country but are best in urban areas (Indonesian Minister of Health Regulation, 2008).

In Indonesia, the Ministry of Health develops strategy through hierarchy services in hospitals, health centers, and the community (Indonesian Minister of Health Regulation, 2017). This strategy is developed following current policies, standards, and guidelines. Hospitals' medical rehabilitation services include specialist/subspecialist services, outreach, and referral systems to provide integrated and comprehensive patient care. Medical rehabilitation services at Community Health centers are intended to provide primary medical rehabilitation services. In addition, they guide the community through community-based rehabilitation programs (including persons with disabilities) and services following the guidelines for medical rehabilitation services at the Community Health centers. For TBI survivors, there is no policy for transitional care programs from hospitals to homes in Indonesia, so it is hoped that the results of this study can be input for the Indonesian government in intermediate care programs for TBI survivors and their caregivers.

Continuous nursing services in Indonesia are regulated in the Regulation of the Minister of Health in 2012. It is explained that patients who require long-term benefits after receiving treatment are carried out in primary services (Minister of Health of the Republic of Indonesia, 2012). In practice, in Indonesia, transitional care services for TBI survivors have not been developed. In Indonesia, most TBI survivors are accompanied by family members in providing social, physical, psychological support to increase patient confidence and quality of life. Effective nursing interventions to treat patients with moderate to severe TBI are still challenging during the transition from hospital to home. In addition, TBI survivors have residual symptoms, so patients and caregivers need good information about home care programs (Ganefianty et al., 2021).

Meanwhile, the barriers to implementing transitional care in Indonesia include long distances, difficulty in transportation, even though the rehabilitation process, and health problems that patients still experience after returning from the hospital remain the responsibility of health workers, including nurses (Ganefianty & Sukihananto, 2018). In response to these obstacles, in 2020, the Ministry of Health will launch six transformations in the health sector to improve the quality of services in the health sector. One of the transformation programs launched is the digital transformation of health. Nurses are one of the essential pillars in digital transformation. Based on the Law of the Republic of Indonesia Number 38 of 2014 concerning Nursing, Article 29 states that some of the nurses' duties are as providers of nursing care, counselors and counselors for patients, and managers of nursing services (Law of the Republic of Indonesia, 2014). The implementation of this task can be done using the telenursing method.

2.3.3 Transitional care for TBI survivors and caregivers in LMIC

Currently, the transitional care program for TBI survivors and caregivers at LMIC is still in the process of being developed. In general, there are no intermediate care programs that specifically treat TBI survivors and caregivers at LMIC. When the TBI survivors are discharged from the hospital, a patient rehabilitation program will be provided in the rehabilitation unit in the hospital's outpatient departments. The following are the search results for articles on intermediate care in TBI survivors and their caregivers in LMIC. Continuity of care in TBI survivors and caregivers needs particular attention, especially in LMICs. This condition is due to the higher incidence of TBI in LMIC compared to high-income countries (Bonow et al., 2018). In addition, the mortality rate of TBI survivors is higher in LMIC for the same injury compared with high-income countries (Krebs et al., 2017).

The transitional care program for TBI survivors and caregivers at LMIC is still in the process of being developed. This condition is due to several states. For example, the government has not adequately diverted resources towards prevention, management, and rehabilitation of head injuries in LMICs such as India (Agrawal et al., 2015). Thus, most TBI survivors in agricultural nations are released to locally established care due to an absence of rehabilitative offices and medical coverage. Moreover, patients discharged obliviously are undeniably challenging to treat at home and are inclined to pressure ulcers, respiratory diseases, scanty sustenance, and physiotherapy.

Epidemiological studies indicate that approximately 43% of TBI survivors experience disability for six months or more, characterized by functional limitations. These post-injury symptoms limit activity, cognitive complaints, and mental health

problems (Rabinowit & Levin, 2014). The literature explains that cognitive impairment in TBI survivors requires special attention and continuity of post-discharge programs from hospitals to optimize patient outcomes and quality of life (Barman et al., 2016). However, treatment among patients with cognitive impairment and other disabilities due to TBI in LMIC is unavailable. From these initial conditions, it appears that although TBI is a widespread public health problem in Kenya, it has not received proper attention in the public and private sectors, as evidenced by the lack of post-acute rehabilitation services for TBI sufferers (Kinyanjui, 2016). Therefore, steps must be taken to prevent TBI-related deaths and the rehabilitation of those who acquire cognitive disability due to TBI to help them return to independent and productive lifestyles.

At LMIC, access to neurosurgical services, advanced critical care, and rehabilitation is limited (Fuller et al., 2016). Also, follow-up administrations that work with long-haul recovery and require significant gear and faculty are less evolved, making treatment results and intricacies more challenging to determine and restricting improvement endeavors. Like other sick patients in the LMIC setting, the explanation is that drawn-out impacts for TBI survivors, including utilitarian status, patient freedom, and monetary effect after TBI, are obscure in Sri Lanka and not commonly known for other LMICs (Samanamalee et al., 2018).

The social and economic status condition can be the reason for the lack of good intermediate care for TBI survivors and caregivers at LMIC. In high-income settings, race and socioeconomic status are inextricably linked in many Latin American countries, with whites earning significantly more wages than nonwhites (De Ferranti et al., 2004). The out-of-pocket costs of these services are prohibitive for many, limiting

post-injury rehabilitation benefits in patients with more significant caregiver' resources. Also, the sociocultural implications of injury persisting with severe disability vary widely between cultures and countries. For example, in some study sites, the concept of withdrawal of care for patients who are unlikely to make a meaningful recovery is unfamiliar to providers and families; on the other hand, families are willing to let a loved one die if the prognosis is unfavorable (Bonow et al., 2018). This article highlights the importance of developing transitional care for TBI survivors and caregivers in LMIC. Like high-income countries, post-discharge outcomes in TBI survivors and caregivers need to receive significant attention from the government. Most importantly, urgent consideration needs to be given to the establishment of rehabilitation facilities for TBI survivors so that they too can have the opportunity to return to an independent lifestyle and to participate in life activities like their peers.

2.4 Readiness for hospital discharge

The long-term outcome of TBI survivors is highly dependent on the discharge planning program provided to the patient and the rehabilitation program consisting of occupational therapy, rehabilitation therapy, recreational therapy, speech therapy, nursing rehabilitation, and case management, which is expected to improve the quality of life of post-treatment patients (Pavlovic et al., 2019). A discharge planning program that is carried out correctly can improve the patient's quality of life after hospitalization (Andrew et al., 2018).

Standard Operating Procedures that apply at Hasan Sadikin Hospital regarding discharge planning for patients contain procedures that must be carried out by nurses

during discharge planning whose stages consist of conveying greetings and explaining the intent and purpose of what will be done to the patient; ask about the patient's identity including name and date of birth; ask about what the patient already knows about his illness, what information the patient knows, and which family members will be involved in further care; The nurse carries out an examination of discharge planning criteria (the patient's age is more than 70 years, is there any difficulty in mobility, the need for medical services; the need for nursing services; the need for daily living, the ability to care for yourself, the ability to use health facilities, and the need for medications); nurses make discharge planning plans according to the results of the assessment; nurses implement the discharge planning, especially in the form of education; nurses evaluate the implementation of discharge planning; and nurses document the results of the preparation and implementation of discharge planning on the patient's return home resume form (Hasan Sadikin Hospital Archives, 2018).

Readiness for hospital discharge is a state and a process characterized by physical stability and competence to manage self-care at home; adequate support for cope after leaving the hospital; psychological ability to working methods; and sufficient information and knowledge to answer common problems (Galvin et al., 2017). Weiss et al. (2011) suggest that perceived readiness reflects the reality experienced by patients and their caregivers (Weiss et al., 2011). Also, Coffey and McCarthy (2013) found that lack of support at home from caregivers was a barrier to discharge readiness (Coffey & McCarthy, 2013). When patients leave the hospital, differences in discharge readiness also increase with age, and perceptions of lower discharge readiness increase the use of post-discharge (Coffey & McCarthy, 2013). Weiss et al. (2014) also determined that

nurses' assessment of low discharge readiness was associated with increased readmission (Weiss et al., 2011).

The Preparedness for Caregiving Scale (CPS) (Archbold et al., 1990) is a caregiver self-rated instrument that consists of eight items that ask caregivers how well prepared they believe they are for multiple domains of caregiving. Preparedness is defined as perceived readiness for multiple domains of the caregiving role such as providing physical care, providing emotional support, setting up in-home support services, and dealing with the stress of caregiving. Responses are rated on a 5-point scale with scores ranging from 0 (not at all prepared) to 4 (very well prepared). The scale is scored by calculating the mean of all items answered with a score range of 0 to 4. The higher the score the more prepared the caregiver feels for caregiving; the lower the score the less prepared the caregiver feels.

Internal consistency has been reported as moderate to high with alphas of .88 to .93 reported (Carter et al., 1998; Hudson & Haym, 2006). Construct and content validity have been demonstrated between caregiver worry and lack of resources (Archbold et al., 1990). In caregivers of brain injury, the Cronbach alpha was .94 and test-retest reliability .92 (Pucciarelli et al., 2014). The Preparedness for Caregiving Scale is brief and easily self-administered by the primary family caregiver. In addition to the eight-item responses, caregivers can specify in writing areas in which they feel unprepared to provide care. The instrument does not ask about specific knowledge or skill needs, thus requires healthcare providers to specifically ask. Other assessment instruments or best practice approaches to care may be appropriate to use during transitions between health care settings, such as the Caregiver Strain Index, dementia-related instruments, and the Transitional Care Model at transitions in care.

2.5. Stress transition

2.5.1 Concept of stress transition

Caregiving intensity (a measure of the caregiving context) impacts the caregiver's psychological well-being, alongside different elements of the caregiving environment, the caregiver's sociodemographic and fitness traits, and private and social assets. Therefore, these models and theories of stress might predict that caregivers could file more significant strain than non-caregivers. In addition, their enjoyment of the caregiving situation (i.e., various caregiving obligations they perform and transitions in caregiving popularity) might impact their notion of stress (Lyons et al., 2015).

Research pronounced that caregivers of TBI survivors stated strain more regularly than despair and tension. Similarly, caregivers suggested slight to extraordinarily rugged ranges of pressure at pre-discharge (45%), one month after discharge (48%), and three-months post-discharge (27%). These findings suggest excessive force in caregivers throughout the transition section from the health center to domestic. High stages of caregiver burden may be understood as a response to role modifications and the family's emotional, sensible, and economic difficulties (Turner et al., 2010).

Caregiving in TBI is associated with various unfavorable consequences for caregiver health, psychological well-being, and satisfaction of life. There also are indirect consequences at the great of patient care. The majority of published studies make a specialty of the poor outcomes of caregiving and families unable to cope. However, notwithstanding the trauma of the initial damage, it ought to be identified that many households move on to manage very well. Although the caregivers enjoy may be associated with many harmful factors individual to their caregiving situation,

the general public of home do record ordinary fantastic studies. Nonetheless, caregiving exerts significant strain and can be mediated by many factors, including preceding family functioning, caregiver appraisal of the scenario, and degree of social help (Blake, 2017).

Substance abuse in TBI survivors brought about the higher caregiver stress. The strongest stress allaying thing become proved to be a healing intervention inside the shape of problem-fixing education. recommendations include proper caregiver education earlier than discharging the TBI survivors from the health center, which would lessen the opportunities of psychological signs and symptoms performing within the caregivers inside the future (Qadeer et al., 2017).

2.5.2 Factors related to stress transition of caregivers of TBI survivors

Following table showed the existing factors related to stress transition among caregivers of TBI survivors.

Table 1

Factors Related to Stress and Burden of TBI caregivers

Variables	Non-modifiable factors	Modifiable factors
Stress (Blake, 2008, 2017; Schlebusch & Walker, 2020).	<ul style="list-style-type: none"> a) physical, psychological, behavioral and personality changes in TBI survivors b) level of patients' symptoms c) impaired executive function in patients, d) pre-injury emotional distress in caregiver e) caregiver age 	<ul style="list-style-type: none"> a) ability to carry out household or work responsibilities b) fear that their relative will not survive c) difficulty in obtaining precise information about the prognosis of relatives permanently life-changing effect

Variables	Non-modifiable factors	Modifiable factors
		<ul style="list-style-type: none"> d) unrealistic expectations about the potential recovery chances of TBI survivors e) awareness that the expected recovery may not occur and difficulty accepting it f) claims made while a patient with TBI is in a rehabilitation facility g) adapt to other changing circumstances after the patient with TBI returns home h) doubt the coping resources of individual caregivers i) difficulty coping j) reduced social interaction and quality of life k) level of patient participation l) family system functioning m) caregiver coping n) social support

In general, in the management of TBI survivors, patients receive excellent attention and sympathy. Their personal needs and rehabilitation efforts are prioritized. Still, the needs of caregivers who have an essential role in caring for TBI survivors are ignored, thereby increasing the caregiver's level of psychosocial burden (Qadeer et al., 2017). A study in Colombia reported that 73% of caregivers showed symptoms of depression, and 55% showed signs of anxiety (Arango-lasprilla et al., 2010).

Based on the literature that discusses factors related to stress in caregivers of TBI survivors, several factors are the main predictor factors in causing stress. These include coping strategies, family functioning, caregiver behavioral characteristics, and social support. These conditions indicate that caregivers require interventions in the

form of family interventions, including assessment elements, educational workshops, follow-up workshops, individualized family support, and marital specialists. Also, caregivers need counseling intervention (Blake, 2008, Schlebusch & Walker, 2020).

2.5.3 The measurement of stress transition among caregivers of TBI survivors

Caregiver Stress Self-Assessment can assess the stress levels of family caregivers (Zarit et al., 1998). It includes 18 items in 3 subscales (stress, health, socialization, sleep, and family strain). The reliability coefficient alpha was .78, sensitivity to predict significant depressive symptoms is .98, with a specificity of .52. This instrument is easy to use and valid self-report screening lives that seem sensitive to detecting depressive symptoms (Epstein-Lubow et al., 2011). However, subjective indicates the need for the development of more objective, quantitative measures of allostatic load (Bevans & Sternberg, 2012).

Kingston Caregiver Stress Scale can also primarily measure the scale used to monitor change in a family caregiver's stress level over time (0 items in 3 subscales), including caregiving, family, and financial issues. The reliability and the validity of the scale were satisfactory, and the tool had Cronbach's alpha= .85. The instrument is a very suitable and straightforward format. It can even be used to monitor changes in stress levels over time because the situation changes. This allows a practitioner not solely to follow the condition of the patient, however, additionally follow the results of the caregiving method on the family caregivers (Pitsikali et al., 2015). However, differences in stress levels across the three studies may replicate variations in the

proportion of younger/child vs. older/spouse caregivers, cultural response designs, healthcare systems, and available support services (Sadak et al., 2017).

2.6 Caregiver burden

2.6.1 Concept of caregiver burden

A scientific overview exploring troubles centered on predicaments faced by caregivers indicate that the mental issues predominately located in caregivers consist of; stress and burden. Caregiver burden can be defined as the level of multifaceted strain the caregiver perceives from caring for a family member with TBI at home after discharge (Liu et al., 2020). One definition of caregiver burden which stresses the multi-layered cost for care suppliers, is the degree to which guardians see providing care affects enthusiastic, social, money related, and profound working (Everhart et al., 2020). Caregiver burden is a sizable hobby as there appears to be a bidirectional dating between caregiver burden and survivor functioning. One takes a look at found that patients receiving care from a caregiver with an excessive stage of psychological burden mentioned poorer neuropsychological functioning than patients who obtained care from an individual with decrease degrees of burden (Lehan et al., 2012). This finding helps tips made over many years that health care specialists ought to contain caregivers in remedy to boost the likelihood of successful healing for TBI survivors. Own family-targeted methods to intervention that include ongoing guides for caregivers are believed to maximize intervention effectiveness for both the affected person and caregiver (Everhart et al., 2020).

The transition intervals within the circle of relatives lifestyles cycle of TBI survivors reevaluate the appropriateness in their preceding life structures within the face

of new illness-related developmental needs. Unfinished commercial enterprise from the prior section can complicate or block motion via the transition (Laratta et al., 2020). It is complicated for caregivers to discover a compromise between members' personal developmental needs and the caregiving needs of a critical illness or disability. A few households then come to be frozen around their family enterprise at the time of the illness, in preference to shift and reorganize to take care of the continual needs of contamination or disability (Getch, 2012). The caregivers desire to take care of the contamination and have energy, sources, and area for the affected person and different family individuals. The stages via which an own family passes over time are related to the high burden skilled with the aid of caregivers. that is in settlement with the speculation that the family goes thru phases that impact its functioning (Getch, 2012).

A study highlights distinct aspects of burden experienced through primary caregivers of adults with excessive TBI (Manskow et al., 2015). Insufficient social community amount, feelings of loneliness, and the affected person's functional reputation were huge unbiased predictors of accelerated caregiver burden. Know-how, the relationship between specific elements of caregiver burden and available elements in a consultant cohort of caregivers, may additionally help become aware of caregivers at danger for high burden and foster destiny interventions. Enhancing the purposeful reputation of the patient will also be the primary goal to alleviate the caregiver burden (Manskow et al., 2015).

2.6.2 Factors related to burden among caregivers of TBI survivors

Following table showed the existing factors related to the burden of caregivers of TBI survivors.

Table 2

Factors related to burden of caregivers of TBI survivors

Variables	Non-modifiable factors	Modifiable factors
Burden (Caplan et al., 2015) (Laratta et al., 2020) (Tezel et al., 2021) (Manskow et al., 2015)	a) patient's functional status b) severe injuries c) caregiver age (the older the caregiver increases the caregiver burden) d) relationship with the patient e) financial condition	a) functioning of the family life cycle b) insufficient social community amount c) feelings of loneliness d) social network

Based on the literature that discusses factors related to caregiver burden, the literature explains that the most substantial predictor factors that cause burden include lack of a social network, feeling lonely, and patient's functional status (Caplan et al., 2015). Furthermore, a study explains that caregivers with limited support will be challenged to have more physical and mental health burdens (Azman et al., 2019).

2.6.3 The measurement of burden of caregivers of TBI survivors

For caregiver burden, The Short- Zarit Burden Interview is an instrument for measuring the caregiver's perceived burden of providing family care (Hebert et al., 2000). It includes a 12-item instrument of personal strain and role strain. The Pearson's correlation coefficient was .53 to .73. The Cronbach's alpha value for the ZBI items

was .93; the intra-class correlation coefficient for the test-retest reliability of the Zarit burden score was .89.

An investigation that evaluated utterly one of a kind short version of the ZBI in caregivers of patients with most cancers, dementedness, and mind injuries determined that the 12-object model had great validity and consistency within the three samples which the most effective mixture of sensitivity and sensitivity at the legendary creature curve was 90 two and 90 four, severally.

The brief model of the ZBI is run to caregivers of sufferers at a specialized medical institution for characteristic psychological issues which a reduce-off purpose of seventeen is coherent for the definition of a high degree of burden; however, imply ratings would possibly vary making a bet at the degree of psychological feature decline in the care recipient (Gratão et al., 2019). However, the differences in the care context and populations may contribute to distinctive ranges of caregiver burden, which underscores the requirement for research that set up a cut-off cause for the evaluation of burden using the ZBI-12, in particular for caregivers of older adult (Gratão et al., 2019).

The Caregiver Burden Inventory also identifies the caregiver burden, with 24 items in 5 dimensions, including time-dependence, developmental, physical, social, and emotional burden. All factors explained 66% of the variance for the quantitative validity. Each factor explained 9%-12% of the variance. For quantitative reliability, the internal consistency reliability of each factor .85, .85, .86, .73, and .77, respectively.

The CBI may be a globally valid device for numerous populations. It could be genuinely accustomed to evaluating caregiver burden across one-of-a-kind pathologies.

The CBI may be a three scale that becomes on the begin developed to judge caregiver burden in dementedness, but, when its development, it indeed became examined in specific caregiver populations in addition and confirmed sturdy validity and dependability characteristics (Greco et al., 2017). However, this does not include personal time due to the need to assist relatives in their ADLs (Conti et al., 2019).

2.7 The innovative transitional care program for the caregivers of TBI survivors and its outcomes assessment.

2.7.1 Evidence related to the existing transitional care program for caregivers of TBI survivors

A wide range of interventions can be used to increase the outcomes among TBI survivors and caregivers. The transitional care program such as primary interventions and the other components. The primary interventions were education (Bushnik et al., 2015; Caplan et al., 2016; Gaines-Dillard, 2015; Kelly et al., 2013; Kreutzer et al., 2018; Moriarty et al., 2016; Trexler et al., 2010) and home community-based rehabilitation (Altman et al., 2010; Winter et al., 2016). The education was delivered after discharge by various personnel or methods: telephone, face-to-face visits, group-education, and in-person, while home community-based rehabilitation refers to home visits by a healthcare provider, such as a nurse, doctor, or occupational therapist, who educate and give the self-care instructions, undertake the physical examination, or provide other care rehabilitation.

Moreover, there were different parts of momentary consideration program, including coached critical thinking (Kelly et al., 2013; Powell et al., 2016), advising (Moriarty et al., 2016; Winter et al., 2016), expertise building, and mental help

(Kreutzer et al., 2015, 2018). The interventionist directed the patients and their parental figures in critical thinking like physiological issues and memory hardships (Powell et al., 2016). Home encounters do advise with an authorized medical services supplier and two phone contacts with the patient and guardians to get their interests and examine intercession targets (Moriarty et al., 2016). On the other hand, the two projects were intended to determine the most frequent issues recognized by TBI survivors, including enthusiasm and stress of the board, and excellent correspondence (Kreutzer et al., 2015, 2018).

Materials utilized in conveying mediation remember a booklet and handbook for different parts of TBI patient and guardian the executives. The span of the momentary consideration program is between 1 and 90 days. A few examinations surveyed the improvement of parental figure results, like adapting reactions and passionate symptomatology (Moriarty et al., 2016; Powell, Fraser, et al., 2016; Trexler et al., 2010). In addition, different investigations were conducted into the guardian trouble decrease and fulfillment improvement (Kreutzer et al., 2015; Moriarty et al., 2016). For the patient's results, a review estimated self-administration improvement (Kelly et al., 2013), while different investigations measure the increment the actual working, decreased mental side effects, and cognitive capacities (Altman et al., 2010; Gaines-Dillard, 2015; Winter et al., 2016), physiological prosperity (Kelly et al., 2013; Kreutzer et al., 2018; Trexler et al., 2010), and local area or work interest (Altman et al., 2010; Trexler et al., 2010; Winter et al., 2016). In rundown, most examinations in this efficient audit estimated the actual working among TBI survivors and the mental side effects of their parental figures.

2.7.2 Evidence related to existing of mobile health program of caregivers of TBI survivors

Telehealth is defined as the delivery of health care services by all health care professionals, for which distance is a critical factor, who use information and communication technologies for the exchange of valid information for the diagnosis, treatment, and prevention of disease and injury, research and evaluation and for the continuing education of health care providers, for the betterment of the health of individuals and their communities (Tuckson et al., 2017). Four elements are closely related to telehealth. Its purpose is to provide problem support, overcome geographic barriers, connect users who are not in the exact physical location, involve different information technology systems, and improve health outcomes (Hamilton et al., 2020).

Mobile health program (m-health) is part of development telehealth. M-health is defined as operating in addition to conventional telehealth apps but consists People can involve those frameworks in their regular habitats or any event when versatile or remote availability might be untrustworthy because of the reality. In a couple of designs, measurements can be saved and sent once the network resumes. They might be utilized for correspondence between a patient or parental figure and a clinician (Nussbaum et al., 2019). Using a phone-based mediation consolidating individualized schooling and guided critical thinking to TBI parental figures can loosen up organizations to individuals with transportation or other access impediments. It could be more practical than giving face-to-face benefits (Caplan et al., 2016).

Telehealth describes a broader range of telemedicine and telenursing, the platforms used are the same, namely video conferencing, streaming media, and landlines and wireless communications, Computerized Decision-Support Systems, m-

health, telephony, databases (Edirippulige, 2011; Hatcher-Martin et al., 2021; Tuckson et al., 2017), where what distinguishes the two electronic health is the services provided, where telemedicine focuses on clinical patient care, telenursing funds focus on nursing care. Furthermore, after the launch of mobile phones in 2000 and developing into smartphones, telehealth services were developed by utilizing mobile phone technology (M-Health) in health services, clinical patient care, and nursing care (Edirippulige, 2011). M-health is defined as operating in addition to conventional telehealth apps but consists of a cellular cellphone or pill app rather than a computer (Nussbaum et al., 2019). So it can be concluded that M-Health is a development of telehealth that utilizes mobile internet-based applications.

People will use those systems in their natural environments or perhaps once mobile or wireless property could also be unreliable thanks to the very fact, in an exceedingly few structures, statistics are often saved and forwarded once property resumes. They will be used for communication between a patient or caregiver and a practitioner (Nussbaum et al., 2019). Using a telephone-based intervention combining personal education and mentored problem-solving to TBI caregivers will stretch out administrations to folks with transportation or alternative access hindrances. It may be a lot of sensible than giving face-to-face advantages (Caplan et al., 2016).

A systematic review described approximately attractiveness of rehabilitation technology in adults with TBI, their caregivers, and healthcare experts (Vaezipour et al., 2019). These results demonstrate a dearth of research reporting on the recognition and usefulness of rehabilitation technology in this space. The reviewed studies commonly mentioned high-quality degrees of attractiveness for the rehabilitation technologies evaluated. These technologies included videoconferencing, videogames,

net-primarily based web portal programs, and computer-primarily based simulation, in addition to therapeutic packages (i.e., telephone apps) and messaging programs (Vaezipour et al., 2019).

A study in New Zealand, namely MyMemory, a mobile augmented memory device that targets to assist TBI survivors in coping with their reminiscence impairments. The result confirmed that the contributors with TBI all pronounced enhancements while using MyMemory regarding their proper-being, memory feature, and autobiographical reminiscence. In addition, the caregivers confirmed those observations of TBI contributors. However, the effects regarding feasible discounts of caregiver burden are mixed.(Chang et al., 2018). From these studies, the application of mobile health in improving the outcomes of TBI survivors and their caregivers is feasible. Moreover, we can apply them during the transition from hospital care to home.

2.7.3 Innovative transitional care program

Training, coached critical thinking, home-and local area-based restoration, directing, ability building, and mental help can be applied in the temporary consideration program among medical hospitals and homes for parental figures and TBI survivors. Utilizing a phone-based intercession consolidating individualized training and coached critical thinking can stretch out the mediations to individuals with transportation or other access preventions. It may be more beneficial than giving up close and personal advantages (Powell et al., 2016). Then again, expertise building and mental help worked on the results of horrendous mind injury patients after release (Bushnik et al., 2015; Kreutzer et al., 2018).

Indonesia, with a total populace of round 268.2 million. It has a vigorous web person penetration of 50-six, mobile utility money owed as numerous as 355.5 million as of January 2019, and a mean of internet utilization per day of 8th and thirty-six min (Handayani et al., 2021). Moreover, the Social Security Agency for Health (BPJS-K) facts in 2017 confirmed the technological trends that caused m-fitness packages attaining 32% of the population, or round ninety two million people (Handayani et al., 2021). With this sort of huge population and using cell and net packages turned into usually accessible by means of the parents, m-health applications can absolutely help within the fitness and welfare of the human beings if they may be appropriately advanced in Indonesia. Furthermore, previous research in the same place shows that all respondents who are TBI survivors have smartphones and access to use internet data so that it is possible to carry out an m health-based transition program (Sutiono et al., 2017).

The rules regarding telenursing in Indonesia have not been regulated. Minister of Health Regulation Number 20 of 2019 concerning the Implementation of Telemedicine Services between Health Service Facilities emphasizes providing health services at health service facilities in remote areas and between health facilities. However, the regulation not consulting individual patients to health workers. Furthermore, the competence of nurses in providing telenursing to TBI survivors will affect nursing care for patients (Rakhmawati, 2020). The social potential of nurses is gentle capabilities inclusive of friendliness and empathy. These skills are important to being concerned angle of nurses. In other arms, personal capability refers to the perspective of nurses to find out. The technique capacity of nurses is related to anamnesis and analytical and verbal skills, and responsiveness (Rakhmawati, 2020).

Also, expert competence refers to the expertise and experience of nurses in the usage of technology and motivation control. Therefore, schooling for telenursing is needed. Exercise can enhance the competence of nurses in telenursing exercise, which in flip improves the first-rate and pleasure of telenursing offerings (Helms, 2016).

2.8 Summary of literature review

TBI is a condition of brain damage due to trauma that can cause various symptoms, including cognitive decline, headaches, impaired mobility, visual disturbances, and emotional disturbances. TBI survivors were categorized into mild TBI, moderate TBI, and severe TBI. The more severe the TBI category in the patient, the more it affects their level of dependence to be a total care patient. These various symptoms can not only appear when the patient is hospitalized but can also persist during the transition period from hospital to home.

In these conditions, the caregiver's role is significant because most TBI survivors are patients with moderate and total dependence levels, so they need help and assistance for eating and drinking, mobilizing, bathing, toileting, and accessing health services. Caring for TBI survivors has been shown of negatively impact on caregivers particularly in transition period from hospital to home regarded as a critical period for TBI care. The conditions that occur in moderate to severe TBI survivors require more TBI care and support systems which integrate essential services to reduce morbidity and mortality rates and the incalculable human suffering that result from neurotraumatic events with appalling sequelae. This critical role of caregivers of TBI survivors can affect the psychological condition of caregivers when caring for patients at home.

Several works of literature explain that caregivers of TBI survivors experience transitional stress and caregiver burden during the transition from hospital to home. What is feared is that the psychological disorder in the caregiver can affect the health condition of TBI survivors, one of which is readmission events 30 days after hospital discharge.

This condition requires intervention in the form of therapeutic intervention in problem-solving coaching and embodying proper caregiver education before the discharge of TBI survivors from the hospital, which can cut back the chance of developing psychological symptoms in caregivers in the future. It is hoped that the stress transition and caregiver burden can be prevented by being prepared for a qualified hospital discharge. Some literature explains that providing education with problem-solving and support can increase the readiness for hospital discharge. In addition, the program can be continued with monitoring and follow-up so that the stress transition and caregiver burden will be reduced, including the readmission rate of TBI survivors. Finally, the transitional care program in this study used mobile applications to facilitate program application without being hindered by distance and transportation problems. This study will test the effectiveness of the innovative transitional care program based on transitional care theory in improving readiness for discharge and post discharged outcomes among caregivers (stress transition and the burden of caregiving) and TBI survivors (readmission) in Indonesia.

CHAPTER 3

RESEARCH METHODOLOGY

The methodology of this study aims to evaluate the effect of the innovative transitional care program in improving post-discharge outcomes among caregivers of TBI survivor. This chapter will discuss details of the study design, experimental setting, target and sample population, instruments, experimental treatment, protection of human subjects, and data analysis.

3.1 Research design

This study used a randomized controlled trial (RCT) design with three points measures. Caregivers of TBI survivors divided into two groups: the experiment group (who received the innovative transitional care program) and the control group (who received standard care program) according to standard operating procedures applicable in the hospital. The research design was as follows:

		Pre-test		Post-test	
		Hospital		Home	
				2 weeks	1 month
Control group	R	O1s, O1b	—————>	O2s, O2b	O3s, O3b, Oa
Experimental group	R	O1s, O1b	—X—> Or	O2s, O2b	O3s, O3b, Oa

O1s : refers to score of stress transition at discharge.

O1b : refers to score of caregiver’s burden at discharge.

Or : refers to assessment of readiness for hospital discharge

- X : refers to the innovative transitional care program
- R : randomization
- O2s : refers to a post-test score of stress transition after receiving the innovative transitional care program two weeks after discharge.
- O2b : refers to a post-test score of caregiver burden after receiving the innovative transitional care program two weeks after discharge.
- O3s : refers to a post-test score of stress transition after receiving the innovative transitional care program one month after discharge.
- O3b : refers to a post-test score of caregiver burden after receiving the the innovative transitional care program one month after discharge.
- Oa : refers to patients' readmission rate at one month after hospital discharge.

3.2 Setting

The study conducted at a Neurosurgery Ward of a Hasan Sadikin Hospital in Bandung, West Java, Indonesia. Caregivers of adult TBI survivors recruited consecutively from the Neurosurgery Ward of Hasan Sadikin Hospital. Potential participants approached and consented to join the research before discharging the TBI survivors from the hospital.

TBI survivors are allocated in two separate rooms (A and B room). Data obtained from the Hasan Sadikin Hospital Medical Records, during the pandemic period, as many as 402 TBI survivors were treated from January to December 2020, and 309 TBI survivors were treated in the period January to June 2021. In the majority, the data includes 60% of TBI survivors in the partial care category, and the remaining 40% are patients with total dependence (Medical Record Hasan Sadikin Hospital,

2021). Hospital regulations stipulate that patients with moderate and severe head injuries receive a maximum of 10 days of hospital treatment. This condition is also adjusted to the clinical pathway regulated by the Indonesian Ministry of Health and the health insurance regulations used in Indonesia.

TBI survivors usually receive treatment according to their condition, including medication, surgery, conservative treatment, and rehabilitation. The doctor in charge of the patient, namely the neurosurgeon, and the nurse in charge of the patient, will determine patient care as needed, including education. After the TBI survivors are discharged from the hospital, the regulation is that the hospital will assign patient responsibility to the community health center where the patient lives. However, this regulation must be fully operational and is still in the refinement stage.

3.3 Population and sample

The target of the population in this study was caregivers of TBI survivors. Therefore, the following inclusion criteria were applied to select the sample from the target population. To get the target caregivers, the criteria of patients were moderate or severe levels of TBI.

3.3.1 Inclusion criteria

The sampling technique in this study used a purposive sampling type. All caregivers of TBI survivors who are going to be discharged at Hasan Sadikin Hospital will be recruited by following the inclusion criteria.

- a. Age 18 or older

- b. Family members who identifies self as a responsible person in caring for patients at home or main caregiver who has assigned by other family members in caring for patients.
- c. Caregivers who provide care of patients with moderate or severe TBI.
- d. Able to communicate, read, write and speak Indonesian well.
- e. Willing to be involved in research.
- f. Have an android phone and can operate it well.
- g. Has a measurement score of The Preparedness for Caregiving Scale (PCS) <16

3.3.2 Exclusion criteria

The exclusion criteria in this study were caregivers for TBI survivors with comorbidity (heart disorders, kidney disorders, and diabetes mellitus). In addition, caregivers for TBI survivors who moved outside of West Java Province after hospitalization or were sick at the hospital not be included in this study.

3.4 Sample size estimation

Consideration was given to the suitable number of subjects in the example size that was important to meet the fundamental legitimacy of the test (Polit and Beck, 2012). The ideal example size was determined by the technique known as "power investigation" (Cohen, 1988). Ideal example size can satisfactorily decide the impacts of a free factor on a reliant variable. Therefore, the procedure below employs a power analysis to calculate the sample size.

A power of .80 at an alpha level of .05 requires an adequate approximation of n as given by the two groups' mean formulas (Cohen, 1988, p.53).

$$n = \frac{2[(a + b)^2 \sigma^2]}{(\mu_1 - \mu_2)^2}$$

Where	n	= the sample size in each of the groups
	a	= conventional multiplier for alpha (.05)
	b	= conventional multiplier for power (.80)
	σ^2	= population variance (SD)
	μ_1	= mean of study outcome in the first group
	μ_2	= mean of study outcome in the second group

Powell, et al.'s study (2016) findings were used to determine the effect size. This randomized controlled trial investigated the effectiveness of telehealth in improving self-management of the caregiver of TBI survivors. Using Cohen's formula, the effect size (d) was .20 ($p < .05$). Subsequently, (Cohen, 1988) was used to estimate the sample size by considering the given significant criterion of $\alpha = .05$, power = .80, where $\mu_1 = 42.1$, $\mu_2 = 49.9$, $SD_1 = 11$, and $SD_2 = 11.3$, and desired effect size was (d) = .20, indicating the minimum required sample size of 31 participants per group. In addition, 20% more participants added per group to overcome an anticipatory dropout, yielding a sample size of 37 per group. This sample size calculation uses reference to previous RCT studies that identified the effectiveness of telehealth in improving self-management of the caregivers of TBI survivors (Powell, et al., 2016).

3.5 Random assignment

In this study, the random assignment process is essential to reduce bias from systematic selection, as it balances the potential confounding variables and equalizes the number of participants in the two groups. Therefore, the "Random Allocation

Software version 2.01 program” chooses to randomize participants into an experimental group or a control group. Random allocation software has been produced to support the first type of randomization. The software is free to download builds as output in the allocation order based on the selected blocking type. The research assistant carried out the randomization process, which is unknown to the principal researcher.

3.6 Research assistant

This research was assisted by one research assistant. Research assistant have job descriptions including conducting randomization processes, measuring the readiness of discharge, stress transition, and caregiver burden before the patient is discharge from the hospital, two weeks after discharge, and one month after discharge. The criteria for research assistant are nurse who have worked in the neurosurgical care unit for at least three years, have a minimum education of a bachelor's degree in nursing, and have communication skills in English.

3.7 Instruments

3.7.1 Experimental instrument

The innovative transitional care program was designed to assist the need for intervention in providing patient care during the transition of TBI survivors from hospital care to home, which nurses and patients can use as users. This program begins with education and face-to-face information using flipcharts and direct demonstration skills. The application can provide an overview of interventions carried out by caregivers of TBI survivors while at home. This improved the quality of service in the

rehabilitation of post-TBI. This application provides education and information on caregivers of TBI survivors regarding (a) how to treat TBI survivors at home, which includes craniotomy wound care of and how to provide nutrition, (b) recognize signs of infection in wounds of craniotomy, (c) recognize emergencies in cases of TBI survivors at home, (d) stress management, and (e) how to arrange a schedule for the care of TBI survivors at home. This program complements routine care, which consists of education about physical health and TBI medical problems, and how to treat TBI survivors at home.

When TBI survivors are still being treated at the hospital, researchers provided direct education to caregivers of TBI survivors about the components contained in the innovative transitional care program, caregiver assisting tool in remembering educational materials that have been provided by researchers while in hospital so that TBI caregivers can access educational materials quickly accompanied by educational videos that can make it easier for them to treat TBI survivors at home. There is also an online chat service within m health that allows direct chat communication between researchers and caregivers at home and can facilitate researchers in ensuring that caregivers use the innovative transitional care program at home. There is also a feature that provides a contact number that can be contacted when the caregiver has problems or needs assistance in caring for patients at home.

The m-Health program is also accompanied by monitoring and follow-up telephones to support caregivers of TBI survivors and assist in solving TBI caregivers' problems during the transition from hospital to home. The innovative transitional care program was run using an android-based operating system. Android is software used

by mobile devices that includes an operating system, middleware, and critical applications. Application development on the Android platform uses the Framework flutter programming language. In addition, Android relies on Linux version 2.6 for core system services such as security, memory management, process management, network stack, and driver models. The kernel also acts as an abstraction layer between the hardware and the rest of the software stack.

The following are the steps in running the innovative transitional care program (Figure 2):

1. When the application is opened, immediately check whether any caregiver data has been saved or not,
 - a. if there is no data in the application, then enter the caregiver data menu
 - b. if there is already data in the application, then enter the innovative transitional care program application menu
2. Fill in caregiver data in the user data menu and save it, then go directly to the innovative transitional care program application menu
3. On the innovative transitional care program application menu (Appendix), there is navigation:
 - a. To go to settings (setting if there is an error in filling caregiver data)
 - b. The innovative transitional care program menu consists of providing education and information regarding (a) how to treat TBI survivors at home, which includes craniotomy wound care and how to provide nutrition, (b) recognize signs of infection in wounds, (c) recognize emergencies in cases of TBI survivors at home, (d) stress management, and (e) how to arrange a schedule

for the care of TBI survivors at home. There is also a feature that provides a contact number that can be contacted when the caregiver has problems or needs assistance in caring for patients at home.

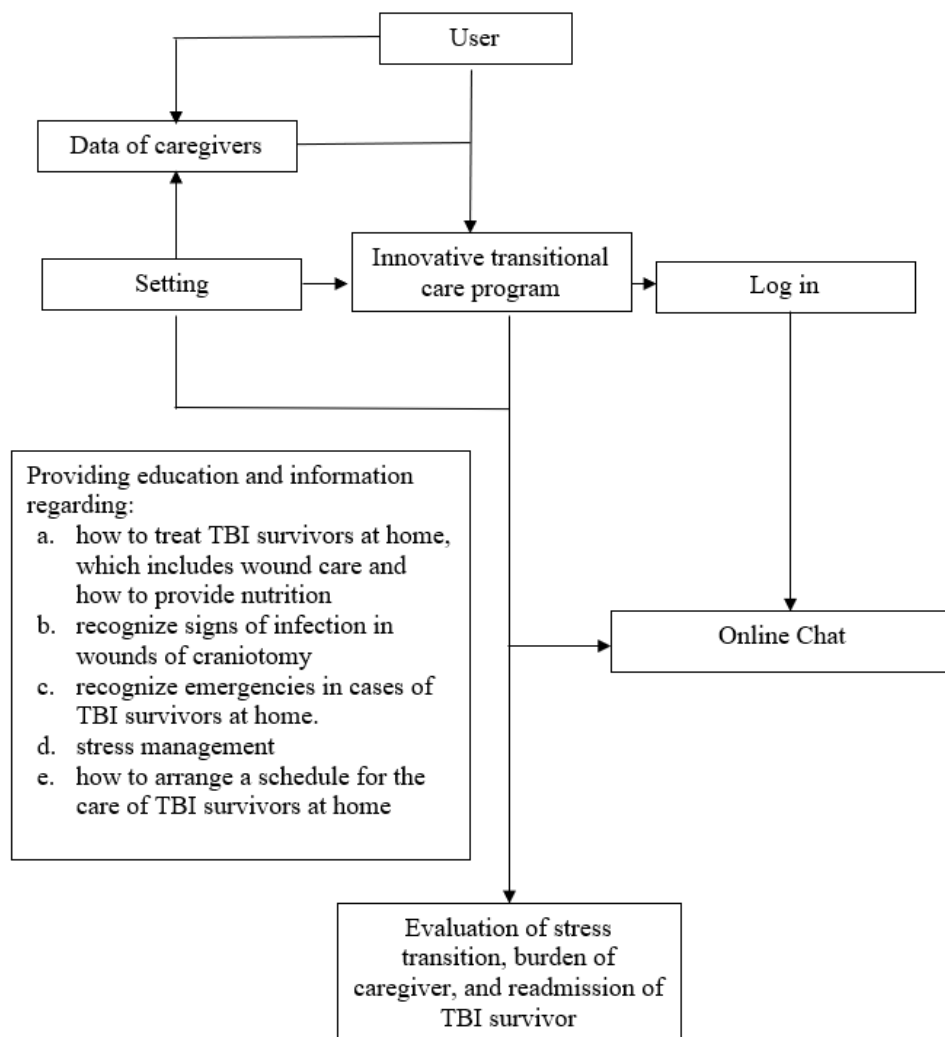
- c. In each educational component, there is one module or video that can study over and over again.
- d. There is an online chat service within m health that allows direct chat communication between researchers and caregivers at home and can facilitate researchers in ensuring that caregivers use the innovative transitional care program at home.

This prototype is designed using a database consisting of users and admins. The user here means caregivers for TBI survivors who will care for TBI survivors during the transition from hospital care to home. The admin in question is a nurse who monitors and evaluates each caregiver's development at home. The admin can also communicate between users in meeting the needs of advanced nurses related to information on the development of their conditions through support by the regular follow-up telephones once a week.

To check the quality of this application, researcher have tested the program content on three experts, including one expert from Thailand and two from Indonesia. In addition, researchers will also conduct a trial of the m-health program on 10 caregivers to find out how easy it is to run the program. The m-health Satisfaction Questionnaire consists of 14 items where the respondent is asked to rate to what extent they agree on each item on a 5-point Likert scale. A higher rating corresponds to a higher agreement (i.e., 1 =strongly disagree, five strongly agree); 10 items are positively stated, while four items are negatively stated. The negatively stated items

were reversed in the analyses; accordingly, higher values correspond to higher leniency. Six modules were used to provide education to ensure the program's reliability, and an interview protocol was prepared during monitoring and follow-up during the second week and first month after discharge.

Figure 2 The innovative transitional care program



3.7.2 Instrument for data collection

The researcher prepared four main types of instruments for data collection. These are: (1) the characteristics of the patients and caregivers, (2) stress transition, (3)

caregiver burden, and (4) readmission rate. The details of each instrument are given below. An instrument is also used to measure readiness for hospital discharge as an initial screening for determining research participants and assessment the readiness of experimental group before discharge.

3.7.2.1 Questionnaire A: Patient's and caregiver's demographics

This questionnaire contains data on the patient's demographics with TBI, including age, gender, diagnosis, Glasgow coma scale, and the patient condition, for the demographics of caregivers consisting of age, gender, relationship with the patient, length of care for the patient, level of job education, and income level.

3.7.2.2 Questionnaire B: Stress transition

The stress transition questionnaire used the Caregiver Stress Self-Assessment from Dr. Steven Zarit, a modified version containing a list of 20 statements that reflect how people sometimes feel when taking care of another person. (Zarit et al., 1998). This questionnaire was first developed in the 1980s by Dr. Steven Zarit to evaluate caregiver stress. After each statement, indicate how often you feel that way: never, rarely, sometimes, quite frequently, or nearly always. The answer scores are Never = 0, Rarely = 1, Sometimes = 2, Quite Frequently = 3 Nearly always = 4. Total scores were summary. This questionnaire has yet to be available in the Indonesian version. This questionnaire was translated into Indonesian and used after permission.

3.7.2.3 Questionnaire C: Caregiver burden

This study used the Short- Zarit Burden Interview (ZBI), which gives a complete evaluation of each goal and subjective burden. It is one of the most customarily used burden measures and verified in many culturally or ethnically exclusive populations (Luo et al., 2010). The Short- Zarit Burden Interview (ZBI) is a 12-item instrument for measuring the caregiver's perceived burden of providing family care. The 12 items are assessed on a 5-factor Likert scale. Items 1 to ten have positive statements so that the value ranges from 0 = 'never' to 4 = 'nearly continually.' While items number 11 and 12 have negative questions, the value ranges from 0 = 'nearly continually' to 4 = 'never.' Item ratings are introduced to give a complete rating ranging from 0 to 48, with higher scores indicating extra burden. The questions awareness on central regions inclusive of the caregiver's health, psychological well-being, finances, social existence, and the relationship between the caregiver and the patient (Hebert et al., 2000).

The ZBI has demonstrated reliability and validity in caregivers of persons with dementia, with an average internal consistency of .86 across studies (Hebert et al., 2000). The ZBI has been used to assess the perceived burden in caregivers of persons with TBI (Sander et al., 2018). Zarit Burden was declared valid and reliable, with a Cronbach's alpha value of .93 (Ochigbo et al., 2018), while the Indonesian version of Zarit Burden was also valid and reliable ($\alpha=.91$) (Maramis, 2020).

3.7.2.4 Readmission rate

The readmission rate in TBI survivors monitored through the hospital's medical record database. The percentage readmission rate was calculated from the number of patients who experienced readmission divided by the total number of patients in each group.

3.7.2.5 Readiness of hospital discharge

A questionnaire to assess readiness for hospital discharge used the The Preparedness for Caregiving Scale. The Preparedness for Caregiving Scale (CPS) (Archbold et al., 1990) is a caregiver self-rated instrument that consists of eight items that ask caregivers how well prepared they believe they are for multiple domains of caregiving. There are 8 question items. Responses are rated on a 5-point scale with scores ranging from 0 (not at all prepared) to 4 (very well prepared). The scale is scored by calculating the meaning of all items answered with a score range of 0 to 4. If the total score is less than 16, it is indicated that the caregiver is not ready for hospital discharge. Still conversely, if the total score is more than 16, the caregiver is ready for hospital discharge. This questionnaire translated into Indonesian and used after permission.

3.8 Back translation technique

The instruments translated into the Indonesian language through the lower back -translation technique and propose (Polit & Beck, 2013). The source document is

translated into the target language by a qualified team of translators who are native speakers of the target language. This is the forward translation process and involves a translator, editor, and proofreader. During this step, the researcher encourages the translator to highlight potential issues with the source text and any areas where its intended meaning is unclear. Once the forward translation has been completed, this is translated back into the source text language by another translator who has not read the original text. Next, the researcher reviewed the back translation against the source text, one sentence at a time. Again, we used another individual who has had no part in any of the previous translation steps, typically using a senior bilingual linguist. If they identify no discrepancies in meaning or mistranslations, the translation is considered accurate, and the process is complete. However, should they find any inconsistencies, a bilingual table is created, and potential errors are classified into semantic, idiomatic, experiential, and conceptual. The final step is a collaborative approach, with all parties working together.

3.9 Validity and reliability of the instrument

One of the excellent research results was determined by the value of the validity and reliability of the measuring instrument (Polit & Beck, 2013). The validity test that was used in this study was the content validity test and the item validity test. One expert from Thailand and two experts from Indonesia did the content validity, and the results of the questionnaire can assess the outcomes. Item validity was conducted on 30 caregivers of patients treated at Hasan Sadikin Hospital before the study period. The item validity test has been analyzed using SPSS version 26.0.

Test reliability refers to the degree to which a test is consistent and stable in measured what it was intended to measure. This study used an internal consistency reliability test which can looked at the consistency of the score of individual items on an instrument with the scores of a set of items or subscale, typically consisting of several items to measure a single construct. The test used Cronbach's alpha with the help of SPSS version 23.0. The general rule of thumb is that a Cronbach's alpha of .70 and above is good (Heale & Twycross, 2015).

Table 3

Validity and reliability of Indonesian version of instruments

Questionnaire	Validity	Reliability
Caregiver Stress Self-Assessment	The range of the corrected item-total correlation from .77 to .95.	The Cronbach's alpha value was .91.
The Short-Zarit Burden Interview	The range of the corrected item-total correlation from .69 to .93.	The Cronbach's alpha value was .88.
The Preparedness for Caregiving Scale	The range of the corrected item-total correlation from .77 to .95.	The Cronbach's alpha value was .90.

3.10 Pilot study

Before starting this research, the researcher conducted a pilot study on 7 caregivers to determine the feasibility of the proposed study intervention to improve the later study quality and efficiency. The pilot study was performed on seven caregivers of TBI survivors who have the same characteristics as the research inclusion criteria. The initial findings showed that all subjects experienced a decrease of stress transition and caregiver burden at two weeks and one-month post-discharge follow-up.

High satisfaction scores on mHealth were also reported and no patient was readmitted within 28 days.

3.11 Data collection procedure

3.11.1 Preparation phase

At this phase, the researcher carried out the following steps after receiving the permission and recommendation from the Director of Human Resources and Education at Hasan Sadikin Hospital to conduct the research; (1) prepared the materials, the mHealth program on android phone, and the questionnaire package including informed consent form; (2) conducted a pilot study and tested the validity and reliability of the instruments; (3) recruited one research assistant; and (4) conducted the training of the research assistant.

A research assistant carried out the randomization conducting the pre-test and post-test data collection. There are three steps of training for the research assistant. First, the researcher explained the objectives, protocol, randomization process, and the instrument in this study. Secondly, the researcher presented the research assistant's role and responsibility. Thirdly, the researcher and research assistant reviewed each questionnaire. Finally, the research assistant asked about the confusion, and the researcher clarified it during the data collection.

3.11.2 Implementation phase

The data collection for the outcomes was carried out at the following three-time points: 1) one day before patient discharge, 2) two weeks after discharge, and 3) one month after discharge.

In both groups, in the implementation phase, the researcher carry out the following steps: (1) ask the head nurse of neurosurgical wards to selected the caregivers based on the inclusion criteria; (2) asked the caregivers regarding the willingness to join in the study; (3) explained the objective of the study and asked the caregivers to sign the informed consent form; (4) asked the research assistant to conduct the randomization.

The program was performed for the experiment group both at hospital (table 3.2) and after discharged home (Table 3.3).

At hospital (about 6 days)

Day one or about five or six days before the patient discharge, the researcher visited the caregivers to download the program and teach them how to operate it. After the program is successfully downloaded, the researcher guides the program until the caregiver understands. Three sessions of education were provided in the following days after assessing the caregiver's knowledge and abilities.

On day 3, the researcher evaluated the caregiver's knowledge and abilities. Three sessions of education were provided based on the patient's demand of care. The first session addressed the specific care regarding how to provide nutrition for TBI survivors at home using flipchart and demonstration. Education was carried out personally for TBI caregivers in the education room for 30-45 minutes.

On day 4, the second educational session was provided. The researcher repeated the explanation regarding the first meeting if there are parts that the caregiver does not understand. This session addressed craniotomy wound care and how to recognize signs of infection in wounds using flipchart and demonstration. The education was carried out personally in the education room for 45 minutes.

On day 5, the third session was continued. Before starting the third educational session, the researcher evaluated the caregiver's knowledge and abilities related to the second material. The researcher repeated the explanation regarding the first meeting if there are parts that the caregiver does not understand. Third session of education regarding recognizing emergencies in cases of TBI, stress management, and how to arrange a schedule for the care of TBI survivors at home.

Day 6, one day before the patient's discharge, the research assistant measured the readiness of hospital discharge, stress transition and caregiver burden. The researcher informed the Community Health Center around the patient's residence that the patients were discharged from the Hasan Sadikin Hospital by using the form.

After discharged home

After the patient returns home, the researcher continued monitoring and follow-up via Online chat in the m-health and telephone. Each participant has the right to ask questions through the Online Chat regarding the care of TBI survivors at home and the problems caregivers face. Follow-up calls are made every week for four weeks after the patient's discharge. Every week, the principal researcher began each call by asking open-ended questions. Questions began with questions about the patient's signs and symptoms. After that, the researcher asked about the condition of the patient's craniotomy wound, whether there are signs and symptoms of an emergency in the patient for the past one week, the caregiver's ability to provide nutrition, and the problems faced by the caregiver. Also, the researcher asked about caregiver compliance in following the schedule that has been made. Finally, researchers will discuss with caregivers how to overcome problems that caregivers are facing. Suppose there is a

problem that the researcher cannot resolve during the consultation via phone. In that case, the researcher consulted with a neurosurgeon at Hasan Sadikin Hospital. If the patient cannot reach the hospital, the researcher coordinated with the nurses at the Community Health Center around the patient's residence for home visits. The research assistant measured the stress transition and caregiver burden in the second and fourth weeks after discharge. During the study period, researchers evaluated readmission cases and their causes by questionnaire via phone.

In the control group, the caregivers received the usual care. Similar data collection procedures performed by a research assistant. One day before discharge, a research assistant measured the stress transition using the Caregiver Stress Self-Assessment, and caregiver burden used the Short-Zarit Burden Interview. Also, the research assistant measured stress transition and caregiver burden in the second and fourth weeks after discharge.

Table 4

The activities of researchers and caregivers at the hospital

Time	Duration Place	Activities	
		Researcher	Participant
Day 1-2	20 minutes	<ul style="list-style-type: none"> • Ask the head nurse of neurosurgical wards to select the caregivers based on the inclusion criteria. • The head nurse introduces the researcher. • Ask the caregivers regarding their willingness to join in the study. • Explain the objective of the study and ask the caregivers to sign the informed consent form. 	<ul style="list-style-type: none"> • The caregivers actively participated in the session. • The caregiver signed the informed consent form.

Time	Duration Place	Activities	
		Researcher	Participant
		<ul style="list-style-type: none"> • Ask the research assistant to conduct the randomization 	
Day 3	30-45 minutes	<ul style="list-style-type: none"> • The researcher visits the caregivers to download the program and teaches them how to operate it. • After the program is successfully downloaded, the researcher guides the program until the caregiver clearly understands. • Start with the first session of education regarding how to provide nutrition for TBI survivors at home using flipchart and demonstration 	<ul style="list-style-type: none"> • Download the program in the cellphones • Actively participated in the session
Day 4	45 minutes	<ul style="list-style-type: none"> • The researcher evaluates the caregiver's knowledge and abilities related to the first session and then repeats the explanation if there are some parts that the caregiver does not understand or remain unclear. • Continue the second session of education regarding craniotomy wound care and recognize signs of wound infection using flipchart and demonstration 	Actively participated in the session
Day 5	45 minutes	<ul style="list-style-type: none"> • The researcher evaluates the caregiver's knowledge and abilities related to the second material. • The researcher reviews and repeats the explanation regarding the first meeting if there are parts that the caregiver does not understand. • Continue the third session of education regarding how to recognize emergencies in cases of TBI, stress 	Actively participated in the session

Time	Duration Place	Activities	
		Researcher	Participant
		management, and how to arrange a schedule for the care of TBI survivors at home	
Day 6	15 minutes	<ul style="list-style-type: none"> The research assistant (RA) measures the readiness of hospital discharge, stress transition and caregiver burden The researcher informs the Community Health Center around the patient's residence of the patient's discharge from the hospital 	Filled the questionnaire

Table 5

The activities of researchers and caregivers during monitoring and follow up

Time	Duration Place	Activities	
		Researcher	Participant
Follow up twice at one week (week 1) and two weeks (week 2) after hospital discharge.	5-10 minutes	<ul style="list-style-type: none"> Researchers begin each call by asking open-ended questions to ascertain any issues since the last call. Researchers used a problem-solving approach to address the situation. Researcher then asks a series of open-ended questions to help the caregiver apply the problem-solving steps of problem definition, goal setting, solution generation, solution evaluation, and action plan determination to a current concern. 	<ul style="list-style-type: none"> Each caregiver is then asked to identify the concern they wish to address on the call. Actively participated in the session
Only at week 2 after	10 minutes	RA collects the data:	TBI caregivers filled out a questionnaire

hospital discharge		Stress transition, and Caregiver burden	
Three weeks (week 3) and one month (week 4) after hospital discharge	5-10 minutes	<ul style="list-style-type: none"> • Researchers begin each call by asking open-ended questions to ascertain any issues since the last call. • Researchers used a problem-solving approach to address the situation. • Researcher then asks a series of open-ended questions to help the caregiver apply the problem-solving steps of problem definition, goal setting, solution generation, solution evaluation, and action plan determination to a current concern. 	<ul style="list-style-type: none"> • The caregiver is then asked to identify the concern they wish to address on the call. • Actively participated in the session
At one month (week 4) after hospital discharge	10 minutes	RA collects data: Stress transition and Caregiver burden	Caregivers fill out a questionnaire

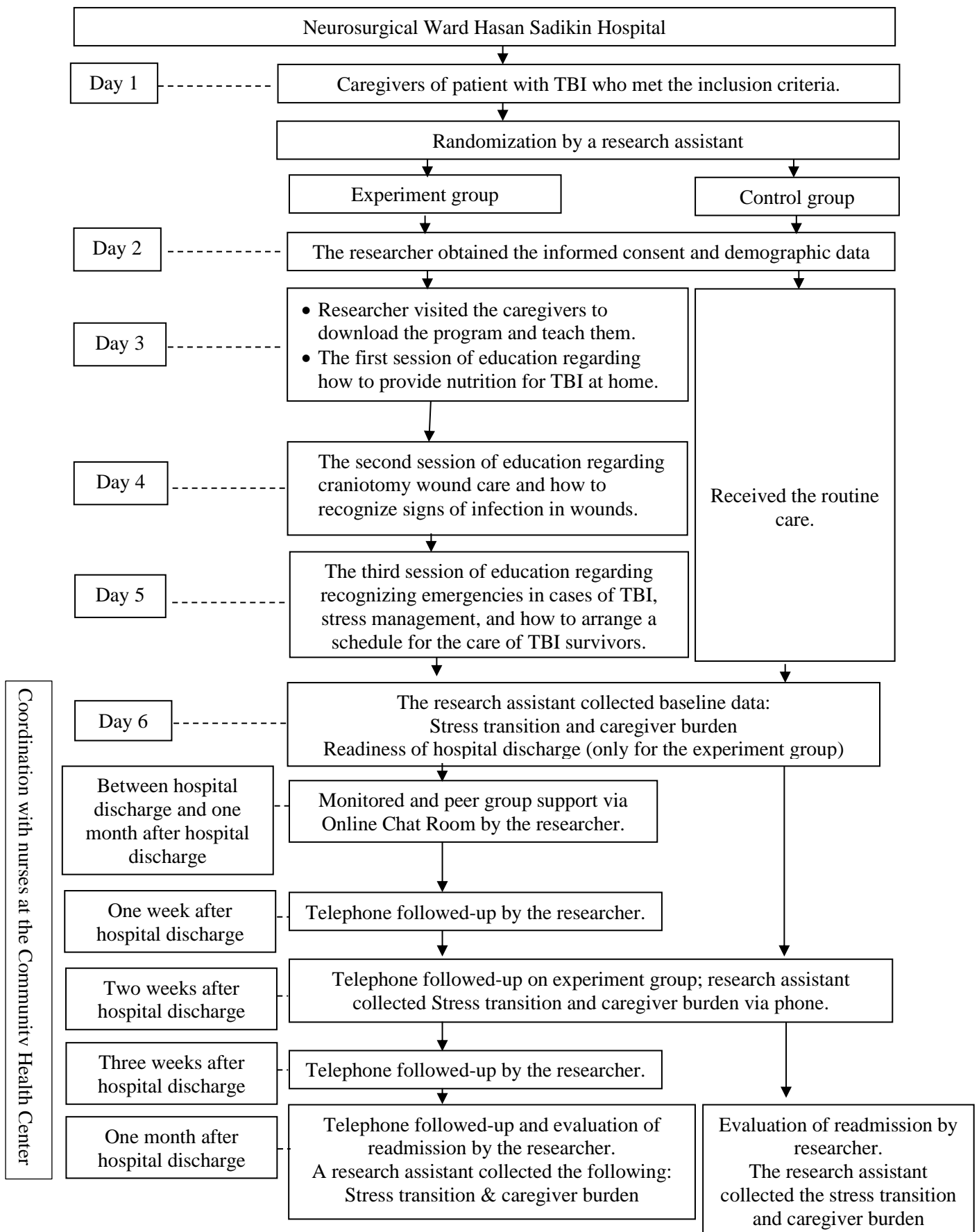


Figure 3 The implementation protocol of data collection procedures

3.12 Research ethics

The ethical principle in this study includes (a) obtaining informed consent from potential research participants, (b) minimizing the risk of harm to participants; (c) protect anonymity and confidentiality; (d) avoiding using deceptive practices; and (e) give participants the right to withdraw from this research. This study was conducted after obtaining approval from the Research Ethics Committee of the Faculty of Nursing, Prince of Songkla University, and permission from Hasan Sadikin Hospital. The head nurse in the ward introduced the researcher to the potential subjects. The researcher explained the objectives of the study, the procedure, and the possible benefits and risks of the study participants. The participants received the information that they had the right to choose whether to participate in the program or withdraw at any time without any negative consequences. The participants verbally agree to participate in the program and write the consent form. The researcher provided contact information for future reference, including a telephone number and address. All the subject's information was kept confidential. Moreover, the participants in the control group received the program after the study was finished.

Also, this research upheld the ethical principle of fidelity, involving the concept of trust. Participants trust researchers, and this necessitates a commitment to protect them. The researcher ensured that the participants understand the risks and thus foster a trusting relationship. In connection with research in the pandemic era, the study guaranteed that the collection data phase applied the principles of health protocols, including maintaining distance and always using masks.

3.13 Threats to internal validity

Considered threats to validity is important because the credibility of study results depends on eliminating or minimizing these threats. An RCT study clearly shows the effect of the independent variable on the dependent variable, and this should not be confounded by other factors (Polit & Beck, 2012). The potential threats to the internal validity of this study controlled as discussed below:

3.13.1 History

If any threat exists between the baseline and the post-test period, the resulting results are not considered a research study intervention. In this study, researchers collected data in one hospital setting, two weeks after discharge, and one month after discharge to maintain the same care provided. In addition, randomization of participants' tasks ensured by research assistant that each experiences the same historical effect.

3.13.2 Maturation

This threat may be present when the observed effect may be due to caregivers becoming older, more substantial, more experienced, or experiencing additional symptoms while caring for TBI survivors between the pre-test and post-test periods. A follow-up period of two weeks and one month may explain this threat in this study. Therefore, the strategy to overcome this problem in this study is to have a parallel control group to equally consider the effect of maturation for both groups. In the control group, at the end of the study, the researcher asked about the caregiver's activities that

can be related to the research outcomes, for example, attending a seminar or workshop regarding the care of TBI survivors at home.

3.13.3 Testing

This condition can occur when an effect can be caused by the number of times a specific response is measured. This can indicate familiarity with the test, which improves the participant's performance. For example, in this study, there was one measure of readiness of hospital discharge and two measures of outcome stress transition, and caregiver burden before the patient was discharged from the hospital, two weeks and one month after discharge. Therefore, the long time between measurement intervals may prevent participants from remembering previous answers; the same situation also occurred in the experimental and control groups.

3.13.4 Statistical regression

This threat is presented when the effect is caused by a participant being assigned to the experimental group because of their low or high score in the pre-test or post-test. In this study, random assignment of participants to each group can help eliminate this problem. Also, the coding process and statistical analysis carried out by third parties (statisticians) to reduce bias in the results and conflicts of interest.

3.13.5 Selection bias

This threat may occur because of differences between selected participants in the experimental or control group. Therefore, a randomized sampling process was used to avoid this study's threat. In addition, the chi-square test, Fisher's exact test, and independent t-test were used to confirm the homogeneity of background characteristics and mean scores of hospital discharge readiness, stress transition, and caregiver burden at baseline in both groups.

3.13.6 Mortality

This threat can be observed when participants leave the program during the intervention. Therefore, in this study, a small payment of one hundred thousand rupiahs for one participant helped with the cost of the android data package. Furthermore, the researcher ensured consistent participation throughout the study. In addition, researchers also conducted monitoring through Online Chat and telephones as monitoring and follow-up effort.

3.13.7 Diffusion or imitation

This condition can occur when individuals in the experiment group interact with those in the control/comparison group. Such cross-contamination via sharing of information can lessen the differences between the intervention and control/comparison group. However, to anticipate this incident, the researcher used the account and password to access the program so that the control group could not access the program. Also, the researcher just used one participant in one room.

3.14 Data analysis procedure

3.14.1 Data management

The process of managing data after receiving the raw data is fundamental. Therefore, detailed checking competed with all questionnaires. The researcher reviewed all the questionnaires to find missing data in case of missing data. If missing data is detected, a solution is sought by asking participants to review and complete it afterward. Researchers re-examined all data carefully before further analysis using the Statistical Package for Social Sciences (IBM® SPSS® version 23) program by a third party (statistician) to ensure the completed data prior to the data analysis process.

3.14.2 Test of statistical assumptions

Data were analyzed using descriptive analysis and inferential statistics. Numerical data types were presented in the form of mean, median, standard deviation, minimum value, and maximum value. Meanwhile, for the presentation of categorical data presented in percentages/proportions. The chi-square test, Fisher exact test, and likelihood ratio were used to test the equivalence of the proportion of demographic data between the control group and experimental group.

The assumption of the normality and homogeneity of variance of data sets were tested before data analysis. Assumptions of dependent variables: hospital readiness, stress transition, and caregiver burden as measurement by the experimental and control groups are continuous data. An independent t-test can test for differences between the two groups at baseline. In this study, the statistical test results for the demographics of TBI survivors and caregivers, as well as the readiness of hospital discharge pre-intervention, stress transition, and caregiver burden before discharge

between two groups, obtained information that the P value for each variable was greater than .05 (p-value > 0.05), which means it was not significant or not statistically significant. Thus, there is no statistically significant mean difference between the variables between the two groups.

This study examined the effect of the innovative intervention over time during program implementation. One-way repeated-measures analysis of variance (one-way RM-ANOVA) compared the difference across the three-time points. Thus, a paired t-test step applied to determine whether the mean scores of the outcomes over time of the same person are similar or different in the parametric test.

CHAPTER 4

FINDINGS AND DISCUSSION

This chapter describes the characteristics of TBI survivors and their caregivers, findings of the study covering the caregiver's stress transition, caregiver's burden, patient's readmission rate one month after hospital discharge, and a discussion of those findings.

4.1 Findings

The study was conducted at Hasan Sadikin Hospital Bandung on 74 caregivers of TBI survivors who met the inclusion criteria. Subjects consisted of 37 participants in the experiment group, and 37 participants in the control group. The findings are shown in five parts as follows:

4.1.1 The characteristics of TBI survivors and their caregiver

4.1.2 Readiness of hospital discharge of the caregivers of TBI survivors

4.1.3 Comparison of the caregiver's stress transition across time, between and within groups.

4.1.4 Comparison of the caregiver's burden across time, between and within groups.

4.1.5 Comparison of patient's readmission rate at one month after hospital discharge between groups.

4.1.1 The characteristics of TBI survivors and their caregiver

The caregivers' characteristics and categorical data (gender, relationship with patients, and education) are presented with frequency and percentage. Meanwhile, age,

gender, length of patient care, and total monthly income, which are numeric data, are presented with the mean, standard deviation, and minimum and maximum values.

The average age of TBI survivors in the experiment group was 35.2 ± 13.9 years, while in the control group it was 38.9 ± 16.6 years. The average GCS score in the intervention group was 12.7 before discharge and increased to 14.3 during the first month of post-discharge follow-up. Likewise, in the control group, the average score on pre-discharge was 12.8 and increased to 14.4 in the first month of follow-up.

The research data showed that, in both the control and experiment groups, all patients had craniotomy wounds and experienced pain before discharge, and most of them used a nasogastric tube. Some patients used urinary catheters and tracheostomies, had difficulty moving, and experienced visual disturbances. At a follow-up of one month after discharge, the surgical wound was dry, and most patients no longer used an nasogastric tube, urinary catheter, or tracheostomy, especially in patients with severe head injuries. General complaints of pain in both groups decreased, but some patients still experienced mobility and visual disturbances. Most patients were male in the experiment and control group (78.4% and 73%, respectively). For the diagnosis, most patients had moderate TBI, 81.1% in the experiment group and 83.3% in the control group.

Table 6*Characteristics of TBI survivors (N= 74)*

Variables	Experiment group (n=37)	Control group (n= 37)	Homogeneity of test (p-value)
Age (year)			.501
Mean \pm SD	35.2 \pm 13.9	38.9 \pm 16.6	
Min-Max	18-69	18-75	
Glasgow Coma Scale			
Pre-discharge			.675
Mean \pm SD	12.7 \pm 0.52	12.8 \pm 0.69	
Min-Max	11-13	11-13	
One-month after discharge			.544
Mean \pm SD	14.3 \pm 0.84	14.4 \pm 0.67	
Min-Max	12-15	12-15	
Gender			.633
Male (%)	29 (78.4%)	27 (73%)	
Female (%)	8 (21.6%)	10 (27%)	
Diagnosis			.255
Moderate (%)	30 (81.1%)	31 (83.8%)	
Severe (%)	7 (18.9%)	6 (16.2%)	
Patient's condition			
Pre-discharge			
Craniotomy wound	37 (100%)	37 (100%)	
Nasogastric Tube	21 (56.7%)	22 (59.4%)	
Dower Catheter	10 (27%)	8 (21.6%)	
Tracheostomy	3 (8.1%)	2 (5.4%)	
Pain	37 (100%)	37 (100%)	
Disability to move	12 (32.4%)	14 (37.8%)	
Vision loss	4 (10.8%)	4 (10.8%)	
One-month after discharge			
Craniotomy wound	37 (100%)	37 (100%)	

Variables	Experiment group (n=37)	Control group (n= 37)	Homogeneity of test (p-value)
Nasogastric Tube	8 (21.6%)	10 (27%)	
Dower Catheter	5 (13.5%)	3 (8.1%)	
Tracheostomy	0 (0%)	1 (2.7%)	
Pain	6 (16.2%)	8 (21.6%)	
Disability to move	8 (21.6%)	9 (24.3%)	
Vision loss	4 (10.8%)	4 (10.8%)	

* Independent t-test or chi-square test is significant at $\alpha = 0.05$

In the experiment group, the average caregiver age was 43.4 ± 9.1 years. The average caregiver takes care of patients for 4.16 ± 1.2 days. The average total income per month is 3,450,000 million rupiahs. In the control group, the average age of caregivers was 44.1 ± 8.4 years. The average caregiver takes care of patients for 4.27 ± 1.1 days. Total income per month is 3,250,000 million rupiahs. In the experiment group, most caregivers were female (89.2%), who had a spouse relationship (48.6%) and had moderate education (54.1%). In the control group, most caregivers were female (78.9%), who had a spouse relationship (51.4%), and had moderate education (51.4%).

Table 7*Characteristics of caregivers (N= 74)*

Variables	Experiment group (n=37)	Control group (n= 37)	Homogeneity of test
Age (year)			.435
Mean \pm SD	43.4 \pm 9.1	44.1 \pm 8.4	
Min-Max	24-60	23-60	
Length of patient care			.419
Mean \pm SD	4.16 \pm 1.2	4.27 \pm 1.1	
Min-Max	2-7	2-7	
Total income per month (Rp)			.815
Mean \pm SD	3.450.000 \pm 534.4	3.250.000 \pm 654.4	
Min-Max	2.100.000-5.600.000	2.000.000-6.000.000	
Gender			.599
Male (%)	4 (10.8%)	8 (21.6%)	
Female (%)	33 (89.2%)	29 (78.4%)	
Relationship with patient			.537
Spouse (%)	18 (48.6%)	19 (51.4%)	
Parent- child (%)	15 (40.6%)	16 (43.2%)	
Sibling (%)	4 (10.8%)	2 (5.4%)	
Education			.481
Low (%)	15 (40.5%)	15 (40.5%)	
Moderate (%)	20 (54.1%)	19 (51.4%)	
High (%)	2 (5.4%)	3 (8.1%)	

* Independent t-test or chi-square test is significant at $\alpha = 0.05$ **4.1.2 Comparison of the readiness of hospital discharge between groups**

In this study, the readiness of hospital discharge was also measured in the first approach. It was met the assumption of the normality and homogeneity of variance of

data sets. Table 8 shows the mean scores differences in readiness for hospital discharge in each group. Although the readiness for hospital discharge was increased compared to the baseline or prior intervention in both groups, findings from the dependent t-test data analysis show a significant difference in the experiment group ($p < 0.05$) while those in the control group did not.

In addition, the pre-post scores of discharge readiness between groups were compared. After the intervention, the independent t-test analysis showed that mean scores of readiness for hospital discharge in the experiment group were significantly higher than those in the control group. In contrast, the control group did not show a significant difference, although the readiness score was increased (Table 9).

Table 8

Comparison of the readiness of hospital discharge within groups

Readiness of hospital discharge	Before intervention	After intervention	p-value	df	95%CI	
					Lower	Upper
Experiment group						
Mean ± SD	10.54±2.03	18.54±3.6	.0001	36	-8.913	-7.087
Control group						
Mean ± SD	9.59±1.69	12.81±3.1	.06	30	-4.088	-7.195

* Dependent t-test is significant at $\alpha = 0.05$

Table 9*Comparison of the readiness of hospital discharge between two groups*

Readiness of hospital discharge	Intervention (n=37)	Control (n=37)	p-value	Difference	95%CI	
					Lower	Upper
Before intervention						
Mean ± SD	10.54±2.03	9.59±1.69	.053	0.95	1.813	.079
After intervention						
Mean ± SD	18.54±3.6	12.81±3.1	.0001	5.73	7.308	4.152

* Independent t-test is significant at $\alpha = 0.05$

4.1.3 Comparison of the caregiver's stress transition across time between and within groups

The results showed significant changes in the stress transition score at discharge, two weeks after discharge, and one month after discharge in the experiment group, whereas, in the control group, there were no significant changes over time (Table 10 and 11). Table 10 shows the results of RM-ANOVA statistics in identifying differences in stress transition scores across time (at discharge, at two weeks, and one month after discharge) between groups and within groups. It shows that the mean scores of stress transition were significantly different between the experiment and control group and the change in scores at each point of measurement ($p < 0.01$). There was also a significant interaction between groups and time, affecting the stress transition scores at each measurement point ($p < 0.01$).

Table 10*Comparison of the caregiver's stress transition across time, between groups (N=74)*

Stress transition	Sum of square	df	Mean square	F	p-value
Between subjects					
Within group (error)	1620.9	72	22.513		
Group	2407.03	1	2407.03	106.9	.0001
Within subjects					
Time x within group (error)	942.5	109.8	8.58		
Time	1393.6	1.53	913.4	106.4	.0001
Group x time	915.2	1.53	599.9	69.9	.0001

* RM-ANOVA test is significant at $\alpha = 0.05$ **Table 11***Comparison of the caregiver's stress transition across time, within groups (N=74)*

Stress transition	Discharge	Two weeks after discharge	One month after discharge	Difference	p-value
Intervention					
Mean \pm SD	28.59 \pm 5.4	22.84 \pm 3.1	17.49 \pm 2.1	11.05	.0001
Min-Max	22-47	20-33	14-24		
Control					
Mean \pm SD	29.38 \pm 4.5	26.18 \pm 4.5	23.24 \pm 6.3	6.14	.054
Min-Max	22-47	20-38	14-38		

* RM- ANOVA test is significant at $\alpha = 0.05$

4.1.4 Comparison of the caregiver's burden across time, between and within groups

The results showed significant changes in the caregiver burden score at discharge, two weeks after discharge, and one month after discharge in the experiment group, whereas, in the control group, there were no significant changes over time (Table 12 and 13). Table 12 shows the results of RM-ANOVA statistics in identifying differences in caregiver burden scores across time (at discharge, at two weeks, and one month after discharge) between groups and within groups. It shows that the mean scores of caregiver burden were significantly different between the experiment and control group and the change in scores at each point of measurement ($p < 0.01$). There was also a significant interaction between groups and time, affecting the stress transition scores at each measurement point ($p < 0.01$).

Table 12

Comparison of the caregiver burden across time, between groups (N=74)

Caregiver burden	Sum of square	df	Mean square	F	p-value
Between subjects					
Within group (error)	1097.2	72	15.238		
Group	2446.7	1	2446.7	160.6	.0001
Within subjects					
Time x within group (error)	559.7	116.1	4.82		
Time	696.4	1.61	431.8	89.6	.0001
Group x time	567.9	1.61	352.1	73.05	.0001

* RM- ANOVA test is significant at $\alpha = 0.05$

Table 13*Comparison of the caregiver burden across time, within groups (N=74)*

Caregiver burden	Discharge	Two weeks after discharge	One month after discharge	Difference	p-value
Intervention					
Mean ± SD	19.78±3.5	15.03±2.1	11.62±1.5	8.16	.0001
Min-Max	13-31	12-21	10-15		
Control					
Mean ± SD	22.11±3.0	22.62±2.9	21.59±3.1	.52	.056
Min-Max	18-28	18-28	18-27		

* RM-ANOVA test is significant at $\alpha = 0.05$

The distribution of patients according to readmission rate in the control and the experimental groups shows that, in the control group, one patient experienced readmission, while, in the experiment group, no patient experienced readmission.

4.2 Discussion

In the discussion section, the researcher discusses the characteristics of TBI survivors and their caregivers and the effects of the mHealth supportive care transition program on post-discharge outcomes.

4.2.1 The participants' characteristics

Participants in this study were caregivers of TBI survivors who were treated at Hasan Sadikin Hospital, where the caregivers were divided into an experiment group that was given the mHealth transitional care program intervention and a control group that received standard hospital intervention. The allocation of the two groups was carried out using Random Allocation Software 2.0. The main aim of randomization is

to prevent selection bias by distributing patient characteristics that could affect outcomes randomly between groups so that any differences in outcomes can only be explained by treatment (Akobeng, 2015).

Before discharge, all patients had craniotomy wounds and experienced pain, and most of them used an nasogastric tube. Some patients used urinary catheters and tracheostomies, had difficulty moving and experienced visual disturbances. All the patients experienced pain in their craniotomy wound. The results of this study were supported by the previous studies conducted in the same place, which showed that, before discharge, of the 178 patients interviewed they reported "problems" in the quality of life of mobility (68%), self-care (78%), usual activities (84%), and pain/discomfort (3%), whereas 70% reported "no problems" with anxiety/depression (McAllister et al., 2018). The outcome of post-discharge patients in TBI cases can depend on the severity of the disease, where patients with moderate and severe have more sequels than mild TBI survivors (Moksnes et al., 2023).

At a follow-up of one month after discharge, the surgical wound was dry, and most patients no longer used an NGT, urinary catheter, or tracheostomy, especially in patients with a severe head injury. General complaints of pain in both groups had decreased, but some patients still experienced mobility and visual disturbances. Patients with lower GCS values tend to have sequelae still. The literature explains that the outcomes for patients with moderate and severe TBI will gradually improve and generally return to optimal conditions three months after discharge (Faried et al., 2017).

The caregivers have several characteristics, namely age, gender, length of patient care, total income per month, relationship with patients, and education. From the results of the homogeneity test analysis, there was no significant difference between

the six characteristics of the two study groups. A randomized controlled trial is a trial where subjects are randomized into different groups. After the intervention, the outcomes of the various groups are compared, so it must be ensured that the two groups have homogeneous characteristics to minimize bias in the study results (Husain & Srijithesh, 2016).

In this study, most caregivers were women who were the patients' spouses or parents. Also, the caregivers of TBI survivors had relatively low and medium levels of education. So that caregivers of TBI survivors in low-middle-income countries need a program to bridge the gap in access to services and can offer an alternative opportunity to provide support and interventions to caregivers (Page et al., 2021).

This study was the first in Indonesia for several education levels of caregivers of TBI survivors when they leave the hospital. This combination is because the level of education possessed by most Indonesian people is from low to medium levels. In this study, it was shown that most caregivers had an intermediate level of education in the two research groups. Indonesia's population is the fourth largest in the world. However, only 8.5% managed to graduate from higher education of this large number (Central Bureau of Statistics, 2020). In Indonesia, higher education is a level of education after secondary education consisting of diploma, bachelor, master, specialized postgraduate programs, and doctorate programs imparted by a higher education institution.

While carrying out this research, several caregivers in the experiment group repeatedly asked about the educational materials provided, especially caregivers with low levels of education. When TBI survivors return home, some caregivers clarify the educational materials. Of these, when they were going to do wound care, some

caregivers sent photos containing equipment that would be used to treat wounds, and photos of TBI survivors' wounds before and after treatment. As a result, they said they felt more confident in treating wounds by consulting with health workers.

In addition, the educational material in mHealth, which can be accessed repeatedly when caregivers care for TBI survivors at home, is also advantageous. For example, one of the caregivers said that the TBI survivors cared for experienced three signs from the emergency signs for TBI survivors, namely severe headaches, vomiting, and decreased consciousness. Headaches, projectile vomiting, and decreased consciousness are signs of increased intracranial pressure. These conditions can occur due to a lack of oxygen to the brain and can occur in traumatic brain injury cases (Dixon et al., 2020). The researchers then consulted by telephone with the neurosurgeon at Hasan Sadikin Hospital and discussed that the patient should come to the nearest emergency hospital. The patient was finally taken to the closest emergency hospital, and treatment was carried out through oxygen and medication. After monitoring for six hours in the emergency unit, the patient experienced improvement, namely by increasing awareness, and the patient was sent home.

4.2.2 Effects of innovative transitional care program on post-discharge outcomes

Since the intervention was given at hospital prior to discharge, the readiness of discharge scores in the two study groups were compared before and after the intervention. It was found that the average score in the experiment group was significantly greater than those in the control group. Transitional care comprising

therapeutic nursing (Meleis, 2010) involves three interrelated concepts: assessment of readiness, preparation for the transition, and role supplementation. First, the nurse can identify the patient's health needs and problems during the transition phase. The next stage is preparation for transition. Next, the nurse can create optimal conditions for applying new knowledge and skills through education and coaching. The final stage is role supplementation, a transitional model used to improve the quality of care for people discharged from the hospital. At this stage, caregivers can participate in goals and how to optimize their health. Nurses can assess the readiness of patients and caregivers, prepare them and their environment, and select appropriate interventions to enhance their understanding and skills.

Assessing readiness for hospital discharge has become more necessary for patients' and caregivers' safety, satisfaction, and positive outcomes. A good readiness can promote recovery and achieve a better outcome. This finding shows that nurse assessment of discharge readiness should augment present-day techniques for identifying patients in danger of readmission when discharge choices might be changed, and discharge transition interventions could be implemented to prevent readmission. Discharge readiness assessment should be instructed in prelicensure programs and as continued education schemes for nurses (Bobay et al., 2010).

Readiness for hospital discharge is characterized by physical stability and competence to manage self-care at home; adequate support for coping after leaving the hospital; psychological ability to work methods; and sufficient information and knowledge to answer common problems (Galvin et al., 2017). In the experiment group, the question items that showed a better score than the control group were regarding how well-prepared you are to take care of your family member's physical needs and how

well-prepared you think you are for facing the stress of caregiving, how well-prepared do you think you are to respond to and handle emergencies that involve them, and how well-prepared do you think you are to get the help and information you need from the healthcare provider.

The control group in this study received education from nurses who met patients in the inpatient room, which was part of the hospital's discharge planning program. This program begins with assessing the needs of patients and families and provides interventions according to the assessment results and evaluates them. However, in this standard operating procedure, there has been no assessment of the readiness of patients or their caregivers for hospital discharge. Although the readiness scores in the control group who received routine care were also increased, there were no statistically significant differences.

In this study, the experiment group was given information and increased competency in treating TBI survivors through face-to-face education and mHealth applications, including (a) how to treat TBI survivors at home, which includes wound care and how to provide nutrition, (b) recognize signs of infection in wounds of craniotomy, (c) recognize emergencies in cases of TBI survivors at home, (d) stress management, and (e) how to arrange a schedule for the care of TBI survivors at home. Providing information in three sessions individually can increase caregiver knowledge and competence in caring for TBI survivors at home. The results of other studies also state that providing education and skill improvement, as well as network development with health workers, can make caregivers of TBI survivors more prepared to care for patients at home so as to produce better outcomes for patients and caregivers (Lieshout et al., 2020b).

To ensure caregivers' readiness, the provision of education in this study was carried out through a combination of face-to-face and the mHealth application. Face-to-face, researchers conducted demonstrations for educational material on wound care and nutrition through a nasogastric tube. After the researcher gave an example, the caregiver followed and evaluated. In practice, the obstacle experienced by some caregivers was that they were afraid to take these actions. To anticipate this, the researchers explained the correct procedures for treating wounds and providing nutrition through the nasogastric tube, such as looking at the tube's depth and ensuring that the tube is not pulled. Apart from that, the caregiver also needs to ensure that the patient is in a head-up position when given nutrition and constantly check the residue from the patient's stomach. The researcher explained that the importance of doing these things is to prevent aspiration from occurring, which can be bad for the patient. Teaching skills through demonstration to caregivers to better support patients after hospital admission can improve quality of life and independence and reduce the burden of distraction for patients and caregivers (Smith & Lamb, 2019). With demonstrations, caregivers can try to perform the expected skills, and nurses can quickly evaluate the skills of caregivers before the patient returns home.

4.2.2.1 Stress transition

The transitional care program created was combined using an educational platform via Android, which was previously explained face-to-face to the caregiver. After the TBI survivors come home from the hospital and the caregiver takes care of the patient at home, there is follow up by telephone once a week. Also, caregivers can

discuss through the Online Chat on the mHealth program. Thus, caregivers are expected to have optimal understanding and skills in caring for TBI survivors. The literature concluded that information could improve knowledge and recommended active education strategies, including participant involvement, and planned and repeated educational episodes for reinforcement and clarification (Ostwald et al., 2014). Utilizing a phone-based intercession consolidating individualized training and coached critical thinking can stretch out the mediations to individuals with transportation or other access preventions. It may be more beneficial than giving up close and personal advantages (Powell et al., 2016). Then again, expertise building and mental help worked on the results of horrendous mind injury patients after release (Bushnik et al., 2015; Kreutzer et al., 2018). In this study, mHealth access data showed that, on average, caregivers accessed the program 1-2 times a week to view module content and send online chats to the researcher. However, caregivers who face more problems with patients, especially TBI survivors with severe levels, access programs more often to conduct online chats with the researcher.

This study was informed by Meleis' transitional theory. Transitional care is a set of measures designed to ensure comprehensive coordination and continuity and the availability of a trained practitioner who has up-to-date information on the patient's treatment goals, preferences, and health status (Meleis, 2010). The goal of intervention is to facilitate a healthy transition process as well as healthy outcome responses. Intervention created by a nurse is to facilitate the transition and promote well-being and mastery of the changes that result from the transition. This includes conceptually providing support through vital others, and a care team of advanced observation nurses. Through home visits and phone conferences, the care team tries to clarify what the

person in transition could also be looking at and can bear throughout the transition to recovery; the team then provides information, skills, strategies, self-care, and psychosocial competencies to assist the person cope with the transition expertise.

The stress transition was the first outcome to be measured and compared between the two groups in this study. Transitioning TBI survivors from hospital to home is a problematic event experienced by caregivers because they experience a transitional period when TBI survivors are treated by nurses at the hospital, it then becomes a period when they take care of TBI survivors themselves at home. In this study, caregivers in both groups experienced stress transition scores during discharge, and the experiment group had a lower score than the control group. This condition follows the research results that caregiver of TBI survivors stated stress more regularly than despair and tension. Similarly, a percentage of caregivers suggested slight to extraordinarily rugged ranges of pressure at pre-discharge (45%), one month after discharge (48%), and three-month post-discharge (27%) (Turner et al., 2010).

The stress transition measurements were continued for two weeks and one month after TBI survivors were discharged from the hospital. In both groups, a decrease in the mean stress transition score could be identified at two weeks and one month after discharge. However, the statistical analysis results showed that only the experiment group showed a decrease in the average stress transition score at two weeks and one month after discharge. Caring for patients at home requires giving motivation (Qadeer et al., 2017). A study explains that caregivers with limited support will be challenged to have more physical and mental health burdens (Azman et al., 2019), so this condition requires intervention in the form of therapeutic intervention in problem-solving coaching and embodying proper caregiver education before the discharge of TBI

survivors from the hospital, which can reduce the chance of developing psychological symptoms in caregivers in the future (Qadeer et al., 2017).

After discharge, patients with moderate and severe TBI, when they go home, are still very dependent on their caregivers. They still need help eating, changing clothes, bathing, mobilizing, and treating wounds. Some patients even still have a nasogastric tube attached when they return home. According to the existing literature, which states that TBI occurs globally, it does not only affect individuals who are injured but also those closest to them (e.g., family, partners, and friends). After moderate to severe injury, those in the personal networks of TBI survivors often serve as caregivers or care partners, supporting and assisting individuals with TBI with ongoing functional needs and activities they can no longer manage independently (Juengst et al., 2022).

The innovative transitional care program consists of six modules, namely, how to treat post-craniotomy wounds, how to provide food through a nasogastric tube, ways to manage stress on caregivers, recognize signs of infection in wounds, recognize signs of an emergency in TBI survivors and organize activities treat patients at home. These educational materials can be accessed repeatedly, even when the caregiver is at home. The results of this study follow the results of a systematic review which explains that the findings supported the effectiveness of digital health interventions (Avramovic et al., 2023). Furthermore, in those studies which compared digital health with usual care, there is evidence that digital health interventions may be as effective, and in some cases potentially more effective than usual care, in reducing stress while taking care of the patient. This indicates that applying this fast-emerging model of care in TBI rehabilitation is feasible and can potentially increase accessibility to specialist services for people with TBI and their caregivers throughout their life trajectories.

In the experiment group caregivers, the question item scores showed a higher score on social life has suffered because of caregiving, being able to take care of a patient much longer, social life not sustained because of caring for the patient, not losing control of the life, and could do a better job in caring for the patient. MHealth provides information caregivers need in caring for patients, including how to manage stress. They can easily repeat information by opening the application. The literature concluded that information could improve knowledge and recommended active education strategies that included participant involvement and planned and repeated educational episodes for reinforcement and clarification (Ostwald et al., 2014). Researchers also conducted monitoring and follow-up via telephone in the experiment group, and caregivers were allowed to consult through the Online Chat feature in the mHealth transition care program. This component was also allegedly able to influence the decrease in the stress transition score in the experiment group at two weeks and one month after discharge. Based on the research results, caregivers of TBI survivors with easier access to communicate and consult with health workers have better psychological outcomes than caregivers who live in villages and have difficult access to health services (Rasmussen et al., 2020). These benefits can be drawn from implementing an Android-based program in this study. Even though the patient is far from Hasan Sadikin Hospital, caregivers can still communicate and consult with health workers through the mHealth application and come to the closest healthcare service because the researcher has informed them about the condition of the TBI survivors. A systematic review described approximately attractiveness of rehabilitation technology in adults with TBI, their caregivers, and healthcare experts as very useful for improving patient outcomes (Vaezipour et al., 2019).

4.2.2.2 Caregiver burden

The outcome that was measured in this study was the caregiver burden. Like stress transition, the average caregiver burden score in both groups decreased in the second week and a month after discharge from the hospital. Nonetheless, statistical analysis showed a significant decrease in the caregiver burden score in the experiment group, while, in the control group, it did not. In the experiment group caregivers, the score of the question items shows a higher score on feeling that social life has suffered because of caring for family members, having lost control of life, feeling uncertain about what to do for caregiving, and feeling a need to do a better job in caring for patients. Most of the caregivers in the experiment group said that the education provided by the researchers significantly provided them with provisions for caring for TBI survivors at home. In addition, the ease of conducting discussions via Online Chat, the monitoring, and support of researchers via telephone once a week can reduce the burden of caring for patients. The problems and difficulties they face in caregiving can be asked of researchers and make them feel better.

Transitioning TBI survivors from hospital to home is a health-illness event from nursing interventions to caregiver intervention. This condition desires additional attention from nurses to optimize the patient's well-being. The transition from hospital to house is crucial to innovate TBI survivors and their caregivers. TBI survivors discharged home with additional deficits, impose a care burden on caregivers, limiting preparation and coaching (Imanigoghary et al., 2017). Nurses have helped patients, families, and communities to address transitions by anticipating responses, providing preventent steering, meliorative symptoms, enhancing health and well-being, and supporting the event of self-care actions (Meleis, 2010).

Caregiver burden can be defined as the multifaceted strain the caregiver perceives from caring for a family member with TBI at home after discharge (Liu et al., 2020). As for caregiver burden, the literature explains that limited support will be a challenge in having more physical and mental health burdens (Azman et al., 2019). Providing information about TBI survivors will help reduce the caregiver burden in caring for TBI survivors (Alghnam et al., 2017). The education and training of caregivers of TBI survivors through demonstrations were essential to reduce caregiver burden and prevent complications in TBI survivors after discharge from the hospital (Verma et al., 2018). In this study, the reduction in the burden on caregivers is likely related to the support provided by researchers in the interventions provided. Also, some caregiver questions and confusion, such as the condition of the craniotomy wound, can be consulted and discussed with the nurse through the program provided. A previous study explained that caregivers of TBI survivors with fewer sources of support have a higher risk of experiencing a burden (Griffin et al., 2017).

It can be identified that caregivers who experience higher burden scores are those with patients whose conditions do not significantly improve, such as patients with GCS values that do not increase and immobile mobilization abilities, so caregivers must spend a lot of time and energy in treating patients. Other study investigated whether the severity of the patient's injury, such as a more severe brain injury, was associated with the higher burden by the family member (Doser & Norup, 2016). When the caregiver complained about this to the researcher during the phone follow-up, the researcher and the caregiver discussed problem-solving that could be taken, such as asking for help from other family members in caring for the patient. As a result, two or three days later, the caregiver informed the researcher via Online Chat that his work had become lighter.

The intervention carried out in this research was to equip caregivers with knowledge and skills in caring for patients at home. Also, before going home, the researcher, together with the caregiver, arranges a schedule for caring for the patient, namely a bathing schedule, a schedule for washing the patient, a feeding schedule, and giving medicine so that the caregiver can have time to care for the patient and have time to rest and complete their activities. Setting activities in caring for TBI survivors can make caregivers more organized in carrying out patient care functions to reduce the burden on themselves (Qadeer et al., 2017).

The significant decrease was seen in the statistical analysis both on the caregiver burden score and the stress transition score at the experimental group's second and fourth week of follow-up after the discharge. This condition allegedly occurs because caregivers can feel confident caring for TBI survivors at home. In addition, caregivers can discuss with researchers when facing problems in caring for patients and finding problem-solving solutions. For example, during the first week of follow-up, several caregivers ensured through Online Chat that the patient's craniotomy wound was in good condition and did not have an infection. In the following week's follow-up, caregivers discuss the condition of the patient they are treating. When they encounter problems such as emergency signs, they can discuss and get problem-solving advice and immediately take the patient to the nearest health service. In contrast, in the control group, caregivers could not do this.

4.2.2.3 Patient readmission rate

One patient experienced readmission in the control group, whereas no patient underwent intervention in the experiment group. When asked by the family the reason for the patient's readmission, the family said that shortly after being given milk through the nasogastric tube, the patient coughed and looked short of breath, so the family took the patient to the hospital. These patients also tend to be old. Patients with older age have been associated with worse outcomes. It is believed that, with increasing age, the capacity for brain repair decreases while the susceptibility to complications of TBI increases. Elderly trauma patients (defined as ≥ 65 years in the cited study) are at an increased risk of morbidity and mortality after injury (Kocuvan et al., 2016).

In the experimental group, one caregiver reported via Online Chat that the patient experienced three signs of an emergency: difficulty awakening, vomiting, and seizures. The researchers suggested that the caregiver take the patient to the nearest hospital. After getting seizure medication at the nearest emergency hospital and monitoring for four hours, the patient's consciousness improved, and their vital signs were stable. There were no complaints, so the patient was sent home. The researcher then emphasized the caregiver to continue monitoring and reporting any conditions that indicated an emergency in the patient to the researcher.

When caring for TBI survivors at home, caregivers also play a role in preventing patient readmissions. Hospital readmission is common for patients discharged after TBI (Brito et al., 2019). Forty percent of readmissions occur within the first 30 days after discharge from admission, with most reasons being for septicaemia, urinary tract or wound infection, and aspiration (Brito et al., 2019). Other literature describes that

health literacy education intervention can help mitigate 30-day readmission for TBI survivors (Pollifrone et al., 2021).

Such calls can immediately address the patient's and caregiver's needs, resolve any problems in the transition between care settings, and assess the psychological distress among caregivers. More-effective handoff and improved provider communication can positively affect hospital readmissions, quality of care, and patient satisfaction, ultimately reducing overall healthcare costs while potentially avoiding excessive rehospitalization rates (Mansukhani et al., 2015).

In conclusion, the findings of this study, using multiple education strategies via face-to-face and mHealth, can improve TBI caregivers' readiness and enable them to reduce stress and burden when caring for TBI survivors after discharge to home. Based on Meleis's theory, it guides the intervention to support the caregivers' caring during the transition. The intervention results were evidenced by caregivers' achievement in obtaining readiness to go home, reducing response patterns (stress transition and the burden of caregiving), and reducing the number of patient readmissions.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

This chapter presents the conclusion of the findings, strength, limitation, implication, the recommendations.

5.1 Conclusion

This study identified a test of the effectiveness of the innovative transitional care program based on transitional care theory for the development of a program in improving readiness for discharge and post-discharge outcomes among caregivers (stress transition and the burden of caregiving) and TBI survivors (readmission) in Indonesia. Seventy-four caregivers of TBI survivors included in this study were randomized to 37 people in the experiment group and 37 in the control group who received routine programs at the hospital.

The intervention in the form of the innovative transitional care program is a routine support program for caregivers of TBI survivors. This program consists of education and providing face-to-face information assisted by an Android-based application that can be accessed via a smartphone, skill demonstration, assessment of the readiness of hospital discharge, and weekly monitoring and follow-up after the patient is discharged from the hospital. This application provides education and information on caregivers of TBI survivors regarding (a) how to treat TBI survivors at home, which includes wound care and how to provide nutrition, (b) recognize signs of infection in wounds of craniotomy, (c) recognize emergencies in cases of TBI survivors at home, (d) stress management, and (e) how to arrange a schedule for the care of TBI

survivors at home. This program complements routine care, which consists of education about physical health, TBI medical problems, and how to treat TBI survivors at home.

From patient characteristics, most patients were male with an average age of 37.05 years, and as many as 81.1% had a moderate head injury diagnosis. Most caregivers are women who are wives or mothers of TBI survivors, with an average age of 43.7 years, and have low to moderate education. Low education is caregivers with elementary or junior high school graduates, while moderate education is caregivers with high school graduate education. The homogeneity assumption test shows no significant difference between patient characteristics, caregiver characteristics, the readiness of hospital discharge scores before carrying out the intervention, stress transition scores, and caregiver burden scores before discharge.

The study's results showed that the innovative transition care program effectively increased scores reducing the average stress transition and caregiver burden scores two weeks to one month after discharge from the hospital from the initial score measured before discharge. The RM-ANOVA test showed a significant decrease in scores in the experiment group, whereas the results of the same test in the control group showed insignificant results. The innovative transitional care program also effectively prevents readmission of moderate and severe TBI survivors.

5.2. Strength

In this program, there were various levels of caregiver education. Indonesia's population is the fourth largest in the world. However, only 8.5% managed to graduate from higher education (more than secondary education). Regarding the pilot and actual

study, it is found that even though caregivers have only secondary education, they can easily use this mHealth application. They also said that the Online Chat feature made it easy to ask questions or consult with nurses. The mHealth application program can also be easily downloaded for free on Google Playstore. This transitional care program was combined using an educational platform via Android, which was previously explained face-to-face to the caregiver. After the patient with TBI returned home from the hospital and the caregiver took care of the patient at home, follow-up by telephone once a week was performed. The caregivers had the opportunity to discuss through the Online Chat and were expected to have optimal understanding and skills in caring for TBI survivors. The caregivers were also satisfied with using mHealth, including it was easy to use, suitable to use, the time spent using it has been accepted, the introduction of how to use it was sufficient, it was not overly time-consuming, and it motivated them to take care of the patient according to the procedure described in the program.

Researchers also control this research in some way. First, monitoring and follow-up by telephone are carried out on the same day and time every week. This condition makes it easier for caregivers to remember and take the time to pick up the phone. Second, the research assistant provides a detailed explanation of how to fill out the questionnaire before discharge. This method makes it easier for the research assistant to ask the same questions by telephone two weeks after release and one month after discharge. Third, when the research assistant collects outcome data on control patients, he also asked about activities that might increase caregiver knowledge and skills in caring for patients, such as attending workshops. Finally, the researcher emphasized to the experiment group that researchers would assume that caregivers would have no problems if they did not contact researchers outside of the monitoring

schedule by telephone, so it is highly hoped that caregivers would not hesitate to contact researchers if they have questions or problems encountered in caregiving.

5.3. Limitation

There are several limitations in this research. First, the researchers experienced some difficulties in communicating and collaborating with first-level health facilities to inform the condition of TBI survivors after being treated at Hasan Sadikin Hospital. When returning from the hospital, the neurosurgeon is responsible for the patient making a return letter to the first-level health facility containing the patient's condition at discharge, a summary of the patient's care while in the hospital, and other care needed at home. However, communication becomes one-way, and it is not easy to empower first-level health facilities.

Another limitation is that some caregivers still consult via Online Chat even though the research time has passed, namely one month after discharge. Even though they had been informed from the start that the termination of the study would take place one month after discharge, they said that they only wanted to consult about the condition of the patients they were treating at home. To overcome this condition, the researcher explained to the caregiver that the research period had been completed. However, if the patient has an emergency condition, the caregiver can immediately contact the nearest service facility from his residence.

Another problem is related to the internet network. When the caregiver was still in the hospital, and the patient was still being treated at the hospital, several caregivers had difficulty accessing the program because of the poor internet connection in the

room setting. So, the researchers recommend that caregivers access using the Wi-Fi available in the hospital. When returning from the hospital, caregivers do not experience internet network difficulties in their home area. Nevertheless, to ensure that caregivers have an internet quota, the researchers provided some money as a facility to buy an internet package during the monitoring and follow-up period. This program can only be downloaded from the Google Play store, so it can only be used by Android users and cannot be downloaded for IOS users.

5.4. Implication

This study shows that the innovative transitional care program effectively reduces transition stress and caregiver burden for caregivers of Indonesia's moderate and severe TBI patients. Also, this program can prevent readmission. It is assumed that this program can also increase the readiness of hospital share, so it is essential to study the readiness of hospital share in caregivers with TBI survivors before going home. This policy must be accompanied by hospital provisions regarding guidelines that nurses must carry out in case of caregivers for TBI survivors have yet to achieve a good score, indicating that they are not ready for hospital discharge and caring for patients at home. However, mHealth supportive program can serve as potential sources to enhance the delivery of care services after discharge. In addition, a broader cooperation and collaboration are needed with policymakers, namely hospital directors, health insurers who regulate patient flow from primary to tertiary health facilities, and support from the Indonesian Ministry of Health to maintain the continuity of the innovative transitional care program application.

5.5 Recommendations

5.5.1 Nursing practices

The innovative transitional care program can be used in nursing practice in hospitals to prepare caregivers to care for patients with moderate and severe TBI during the transition from hospital to home. This program can be used as a hospital standard operating procedure to improve patient care outcomes with TBI. More broadly, this program can become a policy from the Indonesian Ministry of Health to be applied to vertical hospitals that have similar characteristics to Hasan Sadikin Hospital. This is related to the Digital Transformation Strategy Ministry of Health 2024. This policy must be followed by a long-term care policy where primary care facilities can help the success of this program during the transition from hospital to home, as well as program sustainability after the transition period.

5.5.2 Nursing education

Currently, it can be identified that there is low exposure to the transitional care practices-related topics on the nursing school syllabus. Materials regarding transitional care for TBI survivors and their caregivers have yet to be made into teaching materials in nursing education institutions in Indonesia. Thus, it will benefit the nursing education institution to add the nursing student's exposure to transitional care between hospital and home. Also, nursing technology competence in Indonesian nursing students and nurses needs to be improved and given serious attention. Educational institutions can create competency technology improvement programs in the nursing education

curriculum and initiate competency improvement for hospital nurses by collaborating with the hospital.

5.5.3 Future research

Further research can be conducted with a larger sample size with multiple centers and engagement of primary healthcare volunteers and add follow-up by conducting nursing home visits in collaboration with local primary healthcare nurses. In addition, this program can be revised by adjusting it to the endemic period the Indonesian government has just imposed.

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Certificate of Approval of Human Research Ethics
Center for Social and Behavioral Sciences Institutional Review Board,
Prince of Songkla University

Document Number: 2022 – St – Nur – 035 (Internal)

Research Title: Effectiveness of m-Health Supportive Care Transition Program in Improving Post Discharged Outcomes Among Traumatic Brain Injury Caregivers: A Randomized Controlled Trial

Research Code: PSU IRB 2022 - St - Nur 036 (Internal)

Principal Investigator: Mrs. Amelia Ganefianty

Workplace: Doctor of Philosophy Program in Nursing Science (International Program), Faculty of Nursing, Prince Songkla University, Hat Yai Campaus

Approved Document: 1. Human Subjects
2. Instrument
3. Informed Consent

Approved Date: December 7, 2022

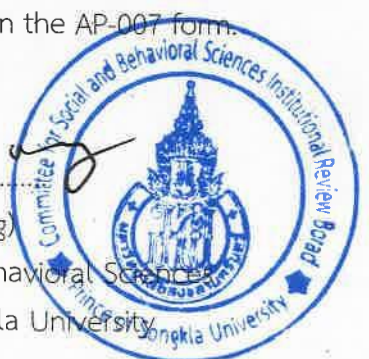
Expiration Date: December 7, 2024

This is to certify that the Center for Social and Behavioral Sciences Institutional Review Board, Prince of Songkla University has approved for Ethics of this research in accordance with Declaration of Belmont. And please report the research result every year in the AP-007 form.

Sasitorn Phumdoung

(Professor Dr. Sasitorn Phumdoung)

Committee Chairman of Center for Social and Behavioral Sciences
Institutional Review Board, Prince of Songkla University





KEMENTERIAN KESEHATAN REPUBLIK INDONESIA
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No. Reg. 12.22.459

PERSETUJUAN ETIK
ETHICAL APPROVAL
NOMOR : LB.02.01/X.6.5/459/2022

Komite Etik Penelitian RSUP Dr. Hasan Sadikin Bandung, dalam upaya melindungi hak asasi dan kesejahteraan subjek penelitian serta menjamin bahwa penelitian yang menggunakan formulir survei/registrasi/surveilans/Bahan Biologi Tersimpan dan non klinis lainnya berjalan dengan memperhatikan implikasi etik, sosial dan non klinis lainnya yang berlaku, telah mengkaji dengan teliti proposal penelitian berjudul :

The Research Ethics Committee of Dr. Hasan Sadikin General Hospital Bandung, in order to protect the right and welfare of the research subject and to guaranty that the research using survey questionnaire/registry/surveillance/archived biological materials/other non clinical materials, will carried out according to ethical, legal social implications and other applicable regulations, has been throughtly reviewed the proposal entitled:

"Efektifitas Penerapan m-Health Supportive Care Transition Program Dalam Meningkatkan Post Discharged Outcomes Pada Traumatic Brain Injury Caregivers: A Randomized Controlled Trial"

Nama Peneliti Utama : Amelia Ganefianty, S.Kep., Ners., M.Kep., Sp.KMB
Principal Researcher

Pembimbing/Peneliti Lain : Assoc. Prof. Dr. Praneed Songwathana
Supervisor/Other Researcher

Nama Institusi : Faculty of Nursing, Prince of Songkla University, Thailand
Institution

proposal tersebut dapat disetujui pelaksanaannya.
hereby declare that the proposal approved

- Penelitian dapat dilaksanakan setelah mendapatkan Surat Izin Penelitian dari RSUP Dr. Hasan Sadikin Bandung atau dari institusi dimana penelitian dilaksanakan.
- Pada akhir penelitian laporan pelaksanaan penelitian harus diserahkan kepada Komite Etik Penelitian RSUP Dr. Hasan Sadikin Bandung.
Jika ada perubahan protokol dan/atau perpanjangan penelitian, harus mengajukan Kembali permohonan kajian etik penelitian (amandemen protokol).
- Research can be carried out after obtaining a research permit from Dr. Hasan Sadikin General Hospital Bandung or from the institution where the research is carried out.*
- At the end of research, a report of reseach implementation must be submitted to Health Research Ethics Committee of Dr. Hasan Sadikin General Hospital Bandung.
If there's a change of protocol and/or a research extension, the principal investigator is required to resubmit the protocol for approval (protocol amendment).*

Ditetapkan di : Bandung
Issued in
Tanggal : 14 Desember 2022
Date



Dr. Ina Rosalina, dr., Sp.A(K), M.Kes., MH.Kes.
NIP. 19601025198/032001



INFORMATION

“Effectiveness of innovative transitional care program in Improving Post Discharged Outcomes Among Traumatic Brain Injury Caregivers: A Randomized Controlled Trial”

Research Access:

This research was carried out by a lecturer at the Faculty of Nursing Unpad who was carrying out a doctoral study at the Faculty of Nursing Prince of Songkla University – Thailand.

The Research Team consists of:

NO.	Research Team	PHONE
1.	Researcher Amelia Ganefianty S.kep., Ners., M.Kep., Sp.KMB	+62 83822490888
2.	Advisor Assoc. Prof. Dr. Praneed Songwathana	+66-74-286502
3.	Review Team Social and Behavioral Sciences Institutional Review Board Committee, Prince of Songkla University (Faculty of Nursing)	+66-74-286470

Background:

Traumatic brain injury (TBI) is a significant health problem that causes death worldwide. Likewise, Indonesia has reported a high incidence of TBI. TBI survivors can experience various effects. Physical effects caused by TBI can interfere with the fulfillment of the patient's daily needs, such as the need for food, and the impact of dressing, bathing or moving because of the symptoms. In addition, patients can experience headaches, loss of vision, loss of ability to walk, mental weakness, cognitive decline, and other conditions caused by damage to the brain because these disorders can continue after the patient is discharged from the hospital, so TBI survivors must seek caregiver assistance at home.

Caregivers are expected to have qualified knowledge and skills as additional nurse's hand in caring for TBI survivors after leaving the hospital. Nurses should be informed about specific care techniques for patients with severe traumatic brain injury, such as enteral feeding, wound care, and knowing the patient's emergency signs. When treating TBI survivors at home, the caregiver also plays a role in preventing readmission. However, for caregivers of TBI survivors, caring for someone with TBI has been shown

to negatively impact caregivers, especially during the transition from hospital to home, which is considered a critical period for TBI care. Most caregivers of TBI survivors report high levels of stress and burden when caring for TBI survivors at home.

To reduce stress and burden on caregivers and prevent readmission to the hospital, therapeutic interventions are needed in developing problems and realizing appropriate caregiver education before the discharge of TBI survivors from the hospital, which can reduce the possibility of developing psychologically in caregivers in the future. TBI caregiver education and training through demonstrations are essential to reduce caregiver burden and prevent complications in TBI survivors after discharge from the hospital. M-Health has become one of the leading public health mediation tools in developing countries and is rapidly adapting to various public health programs in developing countries. Such interventions can be more practical than providing face-to-face benefits. This study will examine the effectiveness of the m-Health supportive care transition program based on transitional care theory for program development in improving discharge readiness and post-discharge outcomes between caregivers and TBI survivors in Indonesia.

Aims:

The aim is to investigate the effects of the m-Health supportive care transition program on response patterns (stress transition and the burden of caregiving) among TBI caregivers as well as patients' readmission rate at one month after hospital discharge.

Why you were chosen:

You were selected in this study because you are Age 18 or older, are family members who identify yourself as a responsible person in caring for patients at home, or a primary caregiver who other family members have assigned to care for patients with moderate or severe TBI, have an android phone and can operate it well, and has a measurement score of The Preparedness for Caregiving Scale (PCS) <16.

Benefit:

By participating in this study, participants could identify their psychological condition in caring for TBI survivors at home. This condition is monitored from when the patient is still hospitalized until a month after discharge. This monitoring is done by telephone once a week and through the online chat feature on the m-health application. Participants also had the opportunity to receive education about TBI patient care at home face-to-face and through the m-health application. There will be reimbursement of telephone package data for participants in this study.

Potential inconvenience and Risk:

During the research, researchers will provide education and information directly with three educational sessions assisted by the m-health program. You need to set aside 30-45 minutes for each session. In addition, when you go home, the researcher will monitor you and the patient through Online Chat and telephone follow-up once a week. This intervention has the potential to cause you discomfort and take up little of your time. However, the researcher will make a time contract with you in advance so as not to interfere with your activities.

Unknown risks may arise.

In general, the possibility of an unknown risk occurring is almost non-existent.

Alternative management:

There is no alternative treatment.

Procedures:

This research has obtained approval and permission from the Ethics Committee and the Director of RSUP, Dr. Hasan Sadikin Bandung. Six days before the patient's discharge, the researcher will visit you to download the program and teach them how to operate it. After that, the researcher will continue with the first education session regarding providing nutrition for TBI survivors at home. After that, education will carry out personally for TBI caregivers in the education room for 30-40 minutes.

The education and information program will continue for four days after the first session. The second session of education regarding craniotomy wound care and recognizing signs of infection in wounds. For TBI caregivers in the education room for 45 minutes, education will carry out personally in the education room. Then, three days before discharge, the researcher will continue the education. The third session of education regarding recognizing emergencies in cases of TBI, stress management, and how to arrange a schedule for caring for TBI survivors at home.

After the patient returns home, the researcher will continue monitoring and follow-up via Online Chat and telephone. Follow-up calls will be made every week for four weeks after the patient's discharge. The principal researcher will begin each call every week by asking open-ended questions to ascertain any issues since the last call.

Volunteering:

Your participation in this research is voluntary and accompanied by the freedom to participate or not participate in this research without coercion or intimidation from any party.

Subjects can be excluded/resigned from the study

Apart from being voluntary, you can withdraw from the study at any time without any sanctions or consequences.

Data confidentiality:

All information you provide in this research is guaranteed to be confidential and only used for research and educational purposes. The code will use in place of your identity and name, which the researcher uses to record the information provided. Your name and personal data will also not be included when the researcher communicates/reports research results to supervisors, publications, or presentations in seminars. All questionnaire files in this study will store on the researcher's personal computer, which is equipped with a password. Likewise, all documents related to this research will hold in a locker that the researcher and the research team can only access. All data in this study will store for approximately two years after this research is completed and will be destroyed afterward.

Possible incurrence of Research costs

The data collection procedure in this study did not incur costs for the participants.

Complications (Complications) and compensation:

The data collection procedure in this study did not cause complications, although it may cause discomfort as described previously. In addition, as a consequence of the participation given, researchers will give a small payment of one hundred thousand rupiahs for one participant will help with the cost of the android data package.

Question:

If deemed necessary, you have the right to ask questions related to the research that I will carry out either directly by telephone (083822490888) or by e-mail (ganefianty@gmail.com).

Bandung, 27th August 2022
Principal Investigator

(Amelia Ganefianty)



Jl. Pasteur No. 38 Bandung
Telp. (022) 2034953-55

**APPROVAL LETTER
TO PARTICIPATE IN RESEARCH**

PROVISION OF INFORMATION

Principal Investigator: Amelia Ganefianty

Name of informant:

Initial of participant:

Witness:

NO	Information	Content of Information
1	Explanation of the study, the duration of the research subject, and the procedures to be followed by the subject	
2	Expected benefits	
3	The potential for the inconvenience and the risks that will arise	
4	Alternative medicine and procedures that also benefit	
5	Maintain the confidentiality of research data	
6	The occurrence of compensation or medical treatment if complications occur	
7	There must be a question that participation is voluntary	
8	There must be an assurance that refusal to participate or refusal will not result in demands, compromises in care, or access to hospital services	
9	There must be a contact person if you have any questions	
10	Etc	
I hereby declare that I (the Principal Investigator) have explained the above matters correctly, clearly and provided the opportunity to ask questions and/or discuss		Principal Investigator (Amelia Ganefianty)

I hereby declare that I have received the information from the Principal Investigator as above and have understood it

Participants

(_____)

Signature and Clear Name
Witness

(_____)

Signature and Clear Name

QUESTIONNAIRE A
DATA CHARACTERISTICS OF RESPONDENT

Instruction:

1. This questionnaire consists of 3 parts, namely a questionnaire regarding the characteristics of respondents, stress transition, and caregiver burden.
2. Please you're willing to fill out the questionnaire according to the actual situation.
3. All the answers you give will not affect the health services provided, so you are requested to fill out the questionnaire according to the conditions experienced by you.

CAREGIVER

Respondent code :

Initial :

Age : years old

Gender : Male/Female

Village :

Phone number : (anymous)

Relationship with patient:

1. Husband and wife
2. Child
3. Parent
4. Brother/sister
5. Other.....

Length of patient care:.....

Total income per month:.....

Education.....

Experience of caring other relative or other persons.....

PATIENT

Initial :

Age : years old

Gender : Male/Female

Diagnose :

GCS :

QUESTIONNAIRE B:

CAREGIVER STRESS SELF-ASSESSMENT

The following is a list of statements that reflect how people sometimes feel when taking care of another person. After each statement, indicate how often you feel that way: never, rarely, sometimes, quite frequently, or nearly always. There are no right or wrong answers.

QUESTIONS: "Do you feel...	Never	Rarely	Some times	Quite Frequently	Nearly Always
1. ...that your loved one asks for more help than he/she needs?	0	1	2	3	4
2. ...that because of the time you spend with your loved on that you don't have enough time for yourself?	0	1	2	3	4
3. ...stressed between caring for your loved one and meeting other family or work responsibilities?	0	1	2	3	4
4. ...embarrassed over your loved one's behavior?	0	1	2	3	4
5. ...angry when you are around your loved one?	0	1	2	3	4
6. ...that caring for your loved one currently affects your relationship with other family members or friends in a negative way?	0	1	2	3	4
7. ...afraid of what the future holds for your loved one?	0	1	2	3	4
8. ...your loved one is dependent on you?	0	1	2	3	4
9. ... your health has suffered because of your involvement with your loved one?	0	1	2	3	4
10. ... that you don't have as much privacy as you would like because of your loved one?	0	1	2	3	4
11. ... that your social life has suffered because of you are caring for your loved one?	0	1	2	3	4
12. ... uncomfortable about having friends over because you are caring for your loved one?	0	1	2	3	4
13. ... that your loved one seems to expect you to take care of him/her as if you were the only one?	0	1	2	3	4
14. ... that you don't have enough money to care for your loved one in addition to the rest of your expenses?	0	1	2	3	4
15. ... that you will be unable to take care of your loved one much longer?	0	1	2	3	4
16. ... you have lost control of your life?	0	1	2	3	4
17. ... you want to leave the care of your loved one to someone else?	0	1	2	3	4
18. ... you should be doing more for your loved one?	0	1	2	3	4
19. ... you could do a better job in caring for your loved one?	0	1	2	3	4
20. ... stressed caring for your loved one?	0	1	2	3	4
Total responses per column	0	1	2	3	4
Multiply total by scale (Never = 0, Rarely = 1, Sometimes = 2, Quite Frequently = 3 Nearly always = 4					
Total					

QUESTIONNAIRE C: ZARIT BURDEN INTERVIEW

Indicate how often you experience the feelings listed by circling the number in the box that best corresponds to the frequency of these feelings.

Questions	Never	Rarely	Sometimes	Quite Frequently	Nearly Always
1) Do you feel that because of the time you spend with your relative that you don't have enough time for yourself?	0	1	2	3	4
2) Do you feel burdened between caring for your relative and trying to meet other responsibilities (work/family)?	0	1	2	3	4
3) Do you feel angry when you are around the sick family member?	0	1	2	3	4
4) Do you feel that your sick family member currently affects your relationship with family member or friends in a negative way?	0	1	2	3	4
5) Do you feel strained when you are around your sick family member?	0	1	2	3	4
6) Do you feel that your health has suffered because of your involvement with your sick family member?	0	1	2	3	4
7) Do you feel that you don't have as much privacy as you would like because of your sick family member?	0	1	2	3	4
8) Do you feel that your social life has suffered because you are caring for your sick family member?	0	1	2	3	4
9) Do you feel that you have lost control of your life since your family's illness?	0	1	2	3	4
10) Do you feel uncertain about what to do about your sick family member?	0	1	2	3	4
11) Do you feel you should be doing more for your sick family member?	0	1	2	3	4
12) Do you feel you could do a better job in caring for your sick family member?	0	1	2	3	4

Total for each column

Total Score _____

HOSPITAL READMISSION

Is there a readmission within 30 days after discharge at TBI survivors?

(Data from hospital medical record)

- a. No
- b. Yes

If yes:

(a) what are the leading causes of patient readmission?

(b) when does the patient start feeling unwell?

THE PREPAREDNESS FOR CAREGIVING SCALE

YOUR PREPARATION FOR CAREGIVING

We know that people may feel well prepared for some aspects of giving care to another person, and not as well prepared for other aspects. We would like to know how well prepared you think you are to do each of the following, even if you are not doing that type of care now.

	Not at all prepared	Not too well prepared	Somewhat well prepared	Pretty well prepared	Very well prepared
1. How well prepared do you think you are to take care of your family member's physical needs?	0	1	2	3	4
2. How well prepared do you think you are to take care of his or her emotional needs?	0	1	2	3	4
3. How well prepared do you think you are to find out about and set up services for him or her?	0	1	2	3	4
4. How well prepared do you think you are for facing the stress of caregiving?	0	1	2	3	4
5. How well prepared do you think you are to make caregiving activities pleasant for both you and your family member?	0	1	2	3	4
6. How well prepared do you think you are to respond to and handle emergencies that involve him or her?	0	1	2	3	4
7. How well prepared do you think you are to get the help and information you need from the health care provider?	0	1	2	3	4
8. Overall, how well prepared do you think you are to care for your family member?	0	1	2	3	4
9. Is there anything specific you would like to be better prepared for? _____					

TOTAL SCORE of the number of items answered: _____					

THE M-HEALTH SATISFACTION QUESTIONNAIRE

	Strongly Disagree				Strongly Agree
	1	2	3	4	5
What did you think about using the health app?					
It was easy to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It was good to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The time spent using it has been acceptable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It has been difficult to remember to use it	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The introduction of how to use it was sufficient	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It was too time consuming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It interrupted me in my daily activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It was boring to use	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It was a disturbance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I can recommend it to others	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How did you experience the health app?					
It has motivated me to change my lifestyle habits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It has helped me to understand the benefits of improving my lifestyle habits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It has helped me to understand how I need to change my lifestyle habits	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It has helped me set personal goals for my lifestyle habits in a way that I could not have done on my own	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Post Discharge Follow-up Phone Call Documentation Form

Patient initial: _____

Caregiver(s) initial(s): _____

Relationship to patient: _____

Notes: _____

Discharge date: _____

Principal discharge diagnosis: _____

Question	Answer
Sign and symptoms of patient	
The condition of the patient's craniotomy wound	
Signs and symptoms of an emergency in the patient	
Caregiver's ability to provide nutrition	
Caregiver compliance in following the schedule	
Problems faced by the caregiver	

Call Completed: Y N

With whom (patient, caregiver, both): _____

Consultations (if any) made prior to phone call:

- None
- Called neurosurgeon
- Other: _____

If any consultations, note to whom you spoke, regarding what, and with what outcome:

RESEARCH PROTOCOL

1) Study Title

“Effectiveness of the innovative transitional care program in improving post discharged outcomes among traumatic brain injury caregivers: A Randomized Controlled Trial”

2) Study Investigator(s)

Principal Investigator

Amelia Ganefianty

Student of Doctor of Philosophy Program in Nursing Science, Faculty of Nursing, Prince Songkla University, Hat Yai, Thailand

Email: ganefianty@gmail.com

Advisor

Assoc. Prof. Dr. Praneed Songwathana

Associate Professor, Faculty of Nursing, Prince Songkla University, Hat Yai, Thailand

Email: praneed.s@psu.ac.th

Co-advisor

Asst. Prof. Dr. Jintana Damkliang

Assistant Professor, Faculty of Nursing, Prince Songkla University, Hat Yai, Thailand

Email: jintana.d@psu.ac.th

3) Introduction

Traumatic brain injury (TBI) may be a significant well-being issue that causes disability worldwide (Roozenbeek et al., 2013). Indonesia, as an LMIC, has reported a high incidence of TBI. A total of 1,290 people experienced TBI and were admitted to the neurosurgery unit at Hasan Sadikin Hospital, Indonesia, in 2017 and increased to 1460 people in 2018 (Faried et al., 2017).

TBI survivors can experience a wide variety impact due to neurological deficits (Blennow et al., 2016). The physical impact caused by TBI can interfere with the

fulfillment of patients' daily needs, such as the need to eat, dress, bathe, or mobilize because of the symptoms. Caring for someone with TBI has been shown to have a negative impact on caregivers particularly in transition period from hospital to home regarded as a critical period for TBI care.

To reduce stress transition, caregiver burden, and prevent hospital readmission, it is necessary to require intervention before the discharge of TBI survivors from the hospital (Qadeer et al., 2017). m-Health has become one of the main general wellbeing mediation apparatuses in created nations and is quickly adjusting to numerous general wellbeing programs at LMIC (Kazi et al., 2021). This is undoubtedly a challenge and opportunity for nurses in Indonesia to build a transitional care program in the care of TBI survivors which have more complex problems prior and post discharge.

4) Objectives of research

a. General objective

The aim is to investigate the effects of the m-Health supportive care transition program on response patterns (stress transition and the burden of caregiving) among TBI caregivers as well as patients' readmission rate at one month after hospital discharge.

b. Specific objectives

1. Compare the response patterns (stress transition and the burden of caregiving) of TBI caregivers before and after receiving the program within the group.
2. Compare the response patterns (stress transition and the burden of caregiving) of TBI caregivers between the control and experiment groups.
3. Compare patients' readmission rate at one month after hospital discharge. between the control and experiment groups.

5) Research hypothesis

- a. Response patterns (stress transition and the burden of caregiving) of TBI caregivers in the experiment group receiving the m-Health supportive care transition program would be lower than before the intervention.
- b. Response patterns (stress transition and the burden of caregiving) of TBI caregivers in the experiment group receiving the m-Health supportive care transition program, would be lower than those in the control group.
- c. The readmission rate of TBI survivors in the experiment group receiving the m-Health supportive care transition program, would be lower than those in the control group.

6) Study design

This study will use a randomized controlled trial (RCT) design with three points measures. TBI caregivers will be divided into two groups: the experiment group (who receive the transitional care program) and the control group (who receive standard care program) according to standard operating procedures applicable in the hospital.

7) Study Setting/ Location

The study will conduct at a Neurosurgery Ward of a Hasan Sadikin Hospital in Bandung, West Java, Indonesia. Caregivers of adult TBI survivors will recruit consecutively from the Neurosurgery Ward of Hasan Sadikin Hospital. Potential participants will approach and consent to join the research before discharging the TBI survivors from the hospital.

8) Study Population

The target of the population in this study was TBI caregivers. Therefore, the following inclusion criteria will be applied to select the sample from the target population.

9) Eligibility Criteria

a. Inclusion criteria

The sampling technique in this study will use a purposive sampling type. All TBI caregivers who are going to be discharged at Hasan Sadikin Hospital will be recruited by following the inclusion criteria.

- a) Age 18 or older
- b) Family members identify self as a responsible person in caring for patients at home or main caregiver who has assigned by other family members in caring for patients.
- c) Caregivers who provide care of patients with moderate or severe TBI.
- d) Able to communicate, read, write and speak Indonesian well.
- e) Willing to be involved in research.
- f) Have an android phone and can operate it well.
- g) Has a measurement score of The Preparedness for Caregiving Scale (PCS) <16

b. Exclusion criteria

The exclusion criteria in this study were caregivers for TBI survivors with comorbidity (heart disorders, kidney disorders, and diabetes mellitus). In addition, caregivers for TBI survivors who will move locations outside of West Java Province after hospitalization or sick at hospital will also not be included in this study.

10) Study Outcomes

This study has three types of outcomes: caregiver stress, caregiver burden, and readmission of the patient. Caregiver's transitional stress is defined as a demand in which TBI caregivers do not have automatic adaptive responses when facing phases of care for TBI survivors in different settings, from hospital to home. Caregiver burden can be defined as the level of multifaceted tension felt by caregivers caring for TBI survivors at home after discharge from the hospital, related to caregiver health, psychological well-being, finances, social presence, and relationships between caregivers and patients. Finally, the readmission

rate refers to the subsequent inpatient admission of a patient with TBI to an acute care facility at least 30 days after discharge of date discharge from the hospital.

11) Study Procedures

a. Recruitment of participants

In both groups, in the implementation phase, the researcher will carry out the following steps: (1) ask the head nurse of neurosurgical wards to select the caregivers based on the inclusion criteria; (2) ask the caregivers regarding the willingness to join in the study; (3) explain the objective of the study and ask the caregivers to sign the informed consent form; (4) ask the research assistant to conduct the randomization.

b. Randomization

In this study, the random assignment process is essential to reduce bias from systematic selection, as it balances the potential confounding variables and equalizes the number of participants in the two groups. Therefore, the Random Allocation Software version 2.01 program will choose to randomize participants into an experimental group or a control group. Random allocation software has been produced to support the first type of randomization. The software is free to download builds as output in the allocation order based on the selected blocking type. The research assistant will carry out the randomization process, which is unknown to the principal researcher.

c. Study procedure

In both groups, in the implementation phase, the researcher will carry out the following steps: (1) ask the head nurse of neurosurgical wards to select the caregivers based on the inclusion criteria; (2) ask the caregivers regarding the willingness to join in the study; (3) explain the objective of the study and ask the caregivers to sign the informed consent form; (4) ask the research assistant to conduct the randomization.

In the experiment group, six day before the patient discharge, the researcher will visit the caregivers to download the program and teach them how to operate it. After the

program is successfully downloaded, the researcher will guide the program until the caregiver understands. After that, the researcher will continue with the first session of education regarding how to provide nutrition for TBI survivors at home using flipchart and demonstration. Education will carry out personally for TBI caregivers in the education room for 30-40 minutes.

The program of providing education and information will continue on the four day after the first session. Before starting the second educational session, the researcher will evaluate the caregiver's knowledge and abilities related to the first material. The researcher will repeat the explanation regarding the first meeting if there are parts that the caregiver does not understand. Second session of education regarding craniotomy wound care and and recognize signs of infection in wounds using flipchart and demonstration. For TBI caregivers in the education room for 45 minutes, education will carry out personally in the education room.

Then, three days before discharge, the researcher will continue the education. Before starting the third educational session, the researcher will evaluate the caregiver's knowledge and abilities related to the second material. The researcher will repeat the explanation regarding the first meeting if there are parts that the caregiver does not understand. Third session of education regarding recognizing emergencies in cases of TBI, stress management, and how to arrange a schedule for the care of TBI survivors at home.

Then, one day before the patient's discharge, the research assistant will measure the readiness of hospital discharge, stress transition and caregiver burden. The researcher will inform the Community Health Center around the patient's residence that the patients are discharged from the Hasan Sadikin Hospital.

After the patient returns home, the researcher will continue monitoring and follow-up via Online chat in the m-health and telephone. Each participant has the right to ask questions through the Online Chat regarding the care of TBI survivors at home and the problems caregivers face. Follow-up calls will be made every week for four weeks after the patient's discharge. Every week, the principal researcher will begin each call by asking open-ended questions. Questions will begin with questions about the patient's signs

and symptoms. After that, the researcher will ask about the condition of the patient's craniotomy wound, whether there are signs and symptoms of an emergency in the patient for the past one week, the caregiver's ability to provide nutrition, and the problems faced by the caregiver. Also, the researcher will ask about caregiver compliance in following the schedule that has been made. Finally, researchers will discuss with caregivers how to overcome problems that caregivers are facing. Suppose there is a problem that the researcher cannot resolve during the consultation via phone. In that case, the researcher will consult with a neurosurgeon at Hasan Sadikin Hospital. If the patient cannot reach the hospital, the researcher will coordinate with the nurses at the Community Health Center around the patient's residence for home visits. The research assistant will measure stress transition and caregiver burden in the second and fourth weeks after discharge. During the study period, researchers will evaluate readmission cases and their causes by the online questionnaire via google forms.

In the control group, the caregivers will receive the usual care. Similar data collection procedures will be performed by a research assistant. One day before discharge, a research assistant will measure stress transition using the Caregiver Stress Self-Assessment, and caregiver burden using the Short-Zarit Burden Interview. Also, the research assistant will measure stress transition and caregiver burden in the second and fourth weeks after discharge.

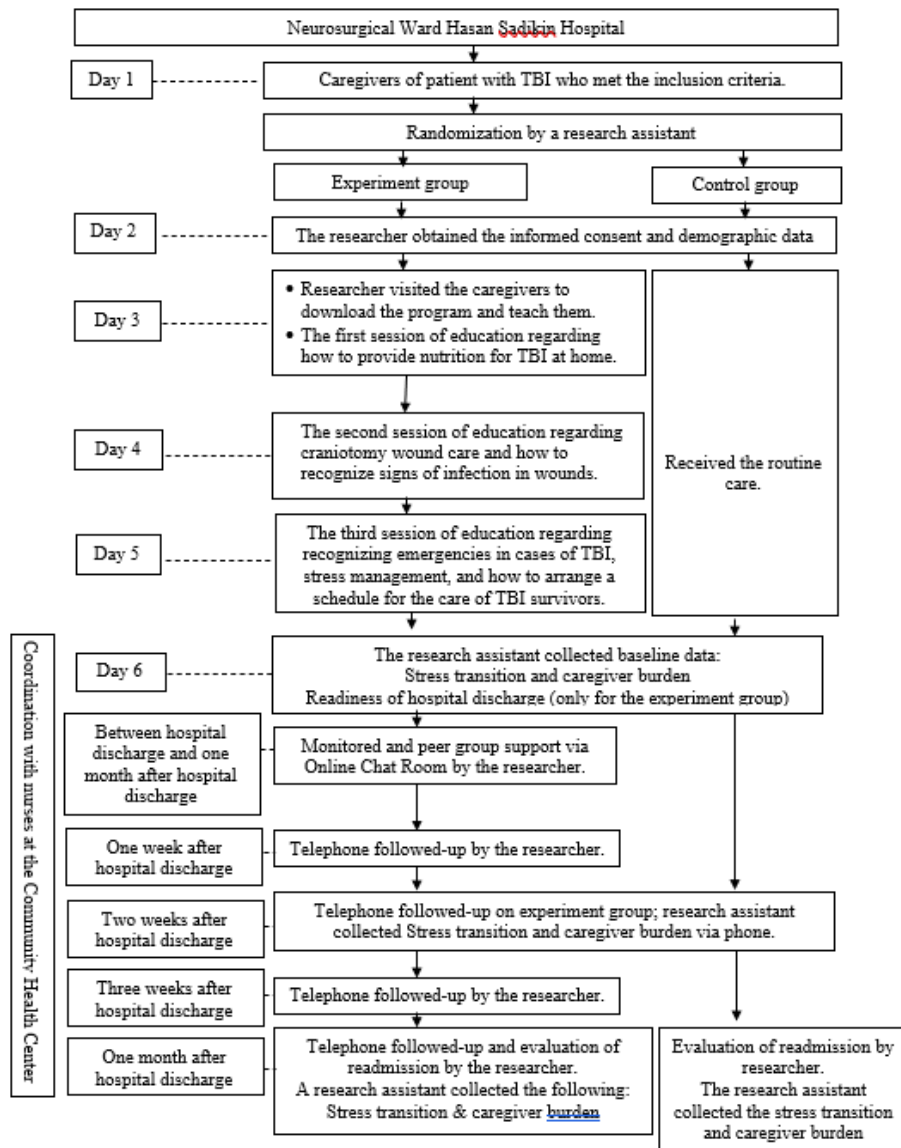


Figure. The implementation protocol of data collection procedures

d. Measurement tools used

The researcher will prepare five main types of instruments for data collection. These are: (1) the characteristics of the patients and caregivers, (2) stress transition, (3) caregiver burden, and (4) readmission rate. The details of each instrument are given below.

An instrument is also used to measure readiness for hospital discharge as an initial screening for determining research participants.

Questionnaire A

This questionnaire contains data on the characteristics of the the patients and caregivers, consisting of age, gender, relationship with the patient, length of care for the patient, level of job education, and income level.

Questionnaire B: Stress transition

The stress transition questionnaire will use the Caregiver Stress Self-Assessment from Dr. Steven Zarit, a modified version containing a list of 20 statements that reflect how people sometimes feel when taking care of another person (Zarit et al., 1998). This questionnaire was first developed in the 1980s by Dr. Steven Zarit to evaluate caregiver stress. After each statement, indicate how often you feel that way: never, rarely, sometimes, quite frequently, or nearly always. The answer scores are Never = 0, Rarely = 1, Sometimes = 2, Quite Frequently = 3 Nearly always = 4. Total scores will be summary and categorize. If the score is 0-20, the caregiver is declared Little/No Stress, 21-40 = Mild/Moderate Stress, 41-60 = Moderate/Severe Stress, and 61-80 = Severe Stress. This questionnaire is not yet available in the Indonesian version. This questionnaire will translate into Indonesian and will use after permission.

Questionnaire C: Caregiver burden

This study will use the Short- Zarit Burden Interview (ZBI), which gives a complete evaluation of each goal and subjective burden. It is one of the most customarily used burden measures and verified in many culturally or ethnically exclusive populations (Luo et al., 2010). The Short- Zarit Burden Interview (ZBI) is a 12-item instrument for measuring the caregiver's perceived burden of providing family care. The 12 items are assessed on a 5-factor Likert scale. Items 1 to ten have positive statements so that the value ranges from 0 = 'never' to 4 = 'nearly continually.' While items number 11 and 12 have negative questions, the value ranges from 0 = 'nearly continually' to 4 = 'never. ' Item

ratings are introduced to give a complete rating ranging from 0 to 48, with higher scores indicating extra burden. The final score is grouped into 0-10: no to the mild burden, 10-20: mild to the moderate burden, and >20: high burden. The questions awareness on central regions inclusive of the caregiver's health, psychological well-being, finances, social existence, and the relationship between the caregiver and the patient (Hebert et al., 2000).

The ZBI has demonstrated reliability and validity in caregivers of persons with dementia, with an average internal consistency of 0.86 across studies (Hebert et al., 2000). The ZBI has been used to assess the perceived burden in caregivers of persons with TBI (Sander et al., 2018). Zarit Burden was declared valid and reliable, with a Cronbach's alpha value of 0.93 (Ochigbo et al., 2018), while the Indonesian version of Zarit Burden was also valid and reliable ($\alpha=0.91$) (Maramis, 2020).

Readmission rate

The readmission rate in TBI survivors will monitor through the hospital's medical record database.

e. Safety considerations/Patient safety

This study will be conducted after obtaining approval from the Research Ethics Committee of the Faculty of Nursing, Prince of Songkhla University, and permission from Hasan Sadikin Hospital. The head nurse in the ward will introduce the researcher to the potential subjects. The researcher will explain the objectives of the study, the procedure, and the possible benefits and risks of the study participants. The participants will receive information that they have the right to choose whether to participate in the program or withdraw at any time without any negative consequences. The participants will verbally convey their agreement to participate in the program and write the consent form. The researcher will provide contact information for future reference, including a telephone number and address. All the subject's information will be kept confidential. Moreover, the subjects in the control group will receive the program after the study is finished.

Also, this research will uphold the ethical principle of fidelity, involving the concept of trust. Participants trust researchers, and this necessitates a commitment to protect them. The researcher will ensure that the participants understand the risks and thus foster a trusting relationship. In connection with research in the pandemic era, the study will guarantee that the collection data phase will apply the principles of health protocols, including maintaining distance and always using masks.

12) Statistical Considerations and Data Analysis

a. Sample size and statistical power

Consideration was given to the suitable number of subjects in the example size that was important to meet the fundamental legitimacy of the test (Polit & Beck, 2013). The ideal example size was determined by the technique known as "power investigation" (Cohen, 1992). Ideal example size can satisfactorily decide the impacts of a free factor on a reliant variable. Therefore, the procedure below employs a power analysis to calculate the sample size.

A power of 0.80 at an alpha level of 0.05 requires an adequate approximation of n as given by the two groups' mean formulas (Cohen, 1988, p.53).

$$n = \frac{2[(a + b)^2 \sigma^2]}{(\mu_1 - \mu_2)^2}$$

Where	n	= the sample size in each of the groups
	a	= conventional multiplier for alpha (0.05)
	b	= conventional multiplier for power (0.80)
	σ^2	= population variance (SD)
	μ_1	= mean of study outcome in the first group
	μ_2	= mean of study outcome in the second group 1.899.99

Powell, et al.'s study (2016) findings were used to determine the effect size. This randomized controlled trial investigated the effectiveness of telehealth in improving self-management of the caregiver of TBI survivors. Using Cohen's formula, the effect size (d)

was 0.20 ($p < 0.05$). Subsequently, (Cohen, 1988) was used to estimate the sample size by considering the given significant criterion of $\alpha = 0.05$, power = 0.80, where $\mu_1 = 42.1$, $\mu_2 = 49.9$, $SD_1 = 11$, and $SD_2 = 11.3$, and desired effect size was $(d) = 0.20$, indicating the minimum required sample size of 31 participants per group. In addition, 20% more participants will add per group to overcome an anticipatory dropout, yielding a sample size of 37 per group. This sample size calculation uses a reference to previous RCT studies that identified the effectiveness of telehealth in improving self-management of the caregiver of TBI survivors (Caplan et al., 2016).

b. Statistical methods

Data management

The process of managing data after receiving the raw data is fundamental. Therefore, detailed checking will compete with all questionnaires. The researcher will review all the questionnaires to find missing data in case of missing data. If missing data is detected, a solution is sought by asking participants to review and complete it afterward. Researchers will re-examine all data carefully before further analysis using the Statistical Package for Social Sciences (IBM® SPSS® version 23) program by a third party (statistician) to ensure the completed data prior to the data analysis process.

Test of statistical assumptions

Data will analyze using descriptive analysis and inferential statistics. The presentation of numerical data types, namely age, length of patient care, income, and readiness of hospital discharge, will be presented in the form of mean, median, standard deviation, minimum value, and maximum value. Meanwhile, for the presentation of categorical data, namely gender relationship with patients, education level, stress transition, caregiver burden, and the incidence of readmission, patients will present in percentages/proportions. The chi-square test, Fisher exact test, and likelihood ratio will test the equivalence of the proportion of demographic data between the control group and experimental group.

The researcher will test the assumption of the normality and homogeneity of variance of data sets. Assumptions of dependent variables: hospital readiness, stress transition, and caregiver burden as measurement by the experimental and control groups are continuous data. Therefore, the normal distribution was checked by the histogram, box plot, and Shapiro Wilk test. If the value of the Shapiro-Wilk Test is more significant than 0.05, the data is normal. If it is below 0.05, the data significantly deviates from a normal distribution. An independent t-test can test for differences between the two groups at baseline if the data have a normal distribution. The Mann-Whitney U test will consider the nonparametric alternative to the independent t-test if abnormal data distribution.

This study will examine the effect of the m-Health intervention over time during program implementation. One-way repeated-measures analysis of variance (one-way RM-ANOVA) will compare the difference across the three-time points. Thus, a paired t-test step will apply to determine whether the mean scores of the outcomes over time of the same person are similar or different in the parametric test. Moreover, Wilcoxon signed-rank test is a nonparametric alternative to paired t-test used to compare paired data when the data are not a normal distribution.

13) Ethical Considerations

This study will be conducted in full conformance with principles of the “Declaration of Helsinki,” Good Clinical Practice (GCP), and within the laws and regulations of Indonesia country. Participants will be given clear information about this study that is needed to know and understand by subject; what the study is about, why subjects are selected, what benefits and risks, how to minimize the risks, what to be expected from the subject, and how long their involvement will be lasting, any incentives of compensation over their involvement, etc. full right to participate or not to participate in the research. Researchers also free participants if at any time they will leave the study.

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PROTOTYPE

The M-health Program Application prototype concept is designed to assist the need for intervention in providing patient care during the transition of TBI survivors from hospital care to home, which nurses and patients can use as users. This program begins with education and face-to-face information using flipcharts and direct demonstration skills. The application can provide an overview of interventions carried out by TBI caregivers while at home. This will later improve the quality of service in the rehabilitation of post-TBI. This application provides education and information on TBI caregivers regarding (a) how to treat TBI survivors at home, which includes craniotomy wound care of and how to provide nutrition, (b) recognize signs of infection in wounds of craniotomy, (c) recognize emergencies in cases of TBI survivors at home, (d) stress management, and (e) how to arrange a schedule for the care of TBI survivors at home. This program complements routine care, which consists of education about physical health and TBI medical problems, and how to treat TBI survivors at home.

When TBI survivors are still being treated at the hospital, researchers will provide direct education to TBI caregivers about the components contained in m-Health. M-Health is a caregiver assisting tool in remembering educational materials that have been provided by researchers while in hospital so that TBI caregivers can access educational materials quickly accompanied by educational videos that can make it easier for them to treat TBI survivors at home. There is also an online chat service within m health that allows direct chat communication between researchers and caregivers at home and can facilitate researchers in ensuring that caregivers use m-health at home. There is also a feature that provides a contact number that can be contacted when the caregiver has problems or needs assistance in caring for patients at home.

The m-Health program is also accompanied by monitoring and follow-up telephones to support TBI caregivers and assist in solving TBI caregivers' problems during the transition from hospital to home. M-health Program Application is run using an android-based operating system. Android is software used by mobile devices that includes an operating system, middleware, and critical applications. Application development on the Android platform uses the Framework flutter programming language. In addition, Android relies on Linux version 2.6 for core system services such as security, memory management, process management, network stack, and driver models. The kernel also acts as an abstraction layer between the hardware and the rest of the software stack.

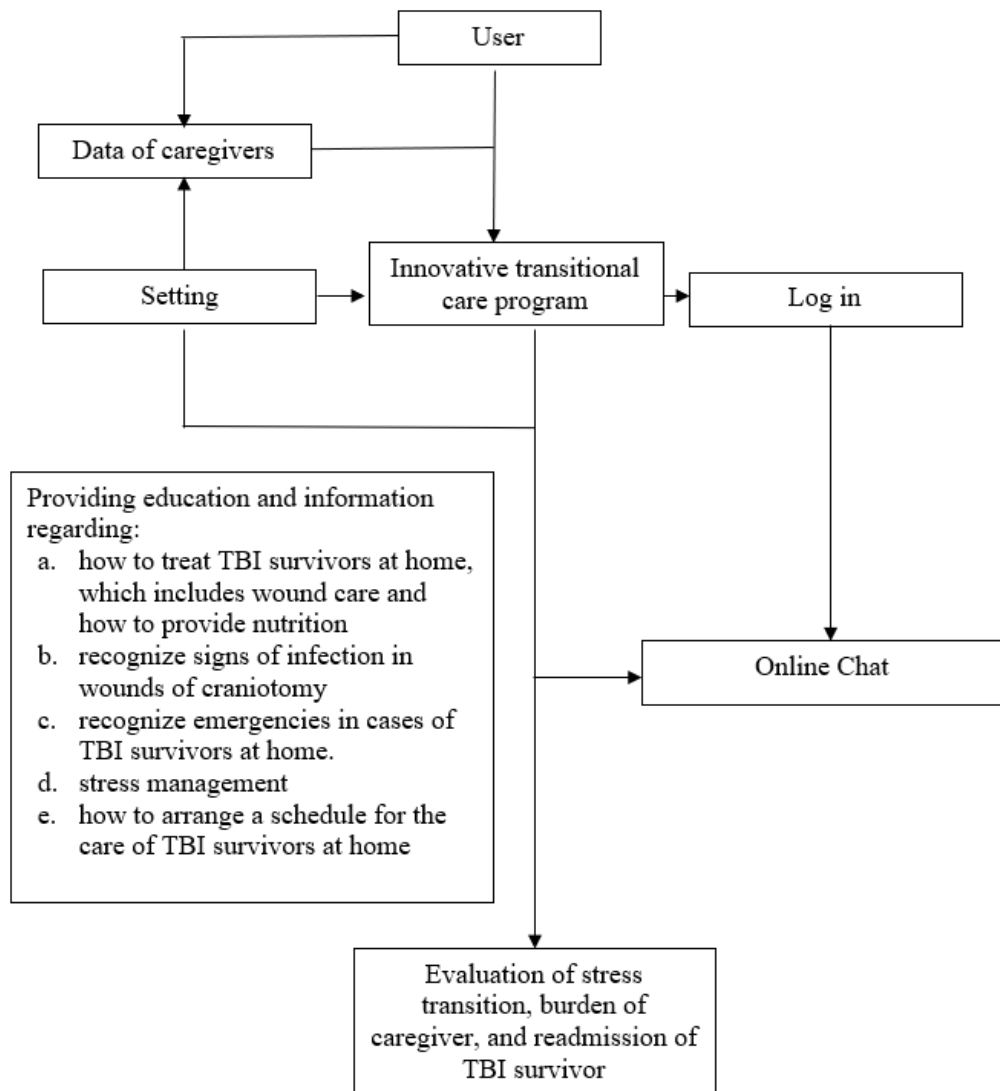
The following are the steps in running the M-health Program Application:

1. When the application is opened, immediately check whether any caregiver data has been saved or not,
 - a. if there is no data in the application, then enter the caregiver data menu

- b. if there is already data in the application, then enter the M-health Program Application menu
 - 2. Fill in caregiver data in the user data menu and save it, then go directly to the M-health Program Application menu
 - 3. On the M-health Program Application menu, there is navigation:
 - a. To go to settings (setting if there is an error in filling caregiver data)
 - b. The M-health Program Application menu consists of providing education and information regarding This application provides education and information on TBI caregivers regarding (a) how to treat TBI survivors at home, which includes craniotomy wound care and how to provide nutrition, (b) recognize signs of infection in wounds, (c) recognize emergencies in cases of TBI survivors at home, (d) stress management, and (e) how to arrange a schedule for the care of TBI survivors at home. There is also a feature that provides a contact number that can be contacted when the caregiver has problems or needs assistance in caring for patients at home.
 - 4. In each educational component, there is one module or video that can study over and over again.
 - 5. There is an online chat service within m health that allows direct chat communication between researchers and caregivers at home and can facilitate researchers in ensuring that caregivers use m-health at home.

This prototype is designed using a database consisting of users and admins. The user here means caregivers for TBI survivors who will care for TBI survivors during the transition from hospital care to home. The admin in question is a nurse who monitors and evaluates each caregiver's development at home. The admin can also communicate between users in meeting the needs of advanced nurses related to information on the development of their conditions through support by the regular follow-up telephones once a week.

To check the quality of this application, researcher have tested the program content on three experts, including one expert from Thailand and two from Indonesia. In addition, researchers will also conduct a trial of the m-health program on 10 caregivers to find out how easy it is to run the program. The health Satisfaction Questionnaire consists of 14 items where the respondent is asked to rate to what extent they agree on each item on a 5-point Likert scale. A higher rating corresponds to a higher agreement (i.e., 1 =strongly disagree, five strongly agree); 10 items are positively stated, while four items are negatively stated. The negatively stated items were reversed in the analyses; accordingly, higher values correspond to higher leniency.



Module 1

Wound Care Management at home

The learning module will begin with how to treat craniotomy wounds in TBI survivors at home. This material is the beginning of learning because, from data obtained from the Neurosurgery Unit of Hasan Sadikin Hospital, seven and eight TBI survivors underwent readmission in 2017 and 2018 with various conditions, including wound craniotomy infection, wound dehiscence, and decreased consciousness.

1. Prepare Yourself and Your Supplies

WHERE:

- a. Choose a location in your home to perform the dressing change. It should have good lighting, adequate space, access to running water, a hard surface like a countertop (not the floor or a bed).
- b. You should be comfortably located near the workspace.

SET-UP:

- a. Turn on the lights in your workspace, turn off any fans and close all windows.
- b. Place a garbage bag near your workspace.
- c. Clean the hard surface you have chosen (e.g., the countertop) with an antibacterial surface wipe. If you do not have an antibacterial surface wipe, clean the surface with a clean cloth and warm, soapy water.

PREPARE AHEAD:

- a. Place the dressing supplies you will need on your clean, hard surface. The dressing supplies you will need will depend on the type of dressings you are using.
- b. Use the Supplies Checklist as a guide.

SET-UP

- Antibacterial surface wipe or a clean cloth and liquid dish soap
- Hand sanitizer or liquid hand soap
- Clean medical gloves (if you have access to them)
- Plastic bag for disposing of items
- Container of dressing supplies
- Disposable dressing tray (if available)

WOUND CLEANSING

- Clean towel
- Gauze pads or paper towels
- Tap water, normal saline or commercial wound cleanser

WOUND INSPECTION

- Patient and Wound Inspection Chart
- Pencil or pen
- Digital camera/smart phone/tablet

DRESSING APPLICATION

- Dressing
 - Tape and/or gauze wrap
 - Clean scissors
 - Alcohol swab for cleaning scissors and forceps
- c. Carefully read the instructions on the dressing packages OR review the instructions given to you by your health-care professional (usually a nurse, doctor or pharmacist).

2. Wash Your Hands

Hand washing with soap and water is best!

- a. Wet your hands with lukewarm water and then apply a small amount of soap to one palm. (Remove rings prior to washing.)
- b. Wash both palms, backs of hands, between fingers on both sides, the fingertips and then the thumbs.
- c. Dry your hands well with a paper towel or clean towel and then use the towel to turn the tap off.

3. Remove and Dispose of the Dressing

- a. If you have access to clean medical gloves, put them on.
- b. Take the old dressing off carefully by gently lifting the edge and moving around the edges of the dressing until the entire dressing is off. Be careful to avoid causing injury to the wound and skin around the wound.
- c. Look at the dressing and remove
- d. If the dressing is the cause of any of these problems call your health-care professional.
- e. Place the soiled dressing in the plastic bag. If you had put on clean medical gloves, remove them and place them in the plastic bag.

4. Wash Your Hands AGAIN

Wash your hands again the way you did in Step 2.

5. Clean the Wound

- a. Place a clean towel under the wounded area to catch any cleansing liquid.
- b. If you have access to clean medical gloves, put them on.
- c. Pour the wound cleansing liquid (sterile saline or warm tap water) into the disposable dressing tray (if you have one) or pour it over the wound or spray the wound with the commercial wound cleanser.
Another option: Put the wound under gentle warm running water from the tap in the sink or tub.
- d. With clean or gloved hands (if available) or with forceps from the dressing tray (if available) use a gauze pad to gently wipe away any wound fluid (drainage) or bits of dressing found in the wound.
- e. Repeat these steps (using a new gauze pad each time) until the wound appears clean. You may expect slight bleeding that should stop once cleansing is completed.
- f. After cleaning the wound, gently pat dry the skin around the outside of the wound using clean gauze

or a paper towel.

- g. Dispose of the all used gauze or paper towel in the plastic bag.

The gauze pad may be sterile (a single pad in a wrapper) or non-sterile (in bulk wrap). Either type is fine but only use supplies that are clean and unused. You can buy gauze pads at pharmacies and medical supply stores.

6. Assess the Wound and Surrounding Skin

- Now that the wound and surrounding skin are clean you can examine them. Use the Patient and Wound Inspection Chart
- Print out a page of the Patient and Wound Inspection Charts
- In one of the charts write in the date of the dressing change and, for each question, mark the answer that best describes how you and the wound are doing.
- Keep all your charts so you have a record of how the wound has improved, stayed the same or gotten worse. This will help you give your healthcare professional a clear picture of the progress or lack of progress of your wound.
- Take a photo of the wound at each dressing change if you have a digital camera/phone/tablet. This can help you track changes over time, and if you need to contact a health-care professional you will be able to show them what the wound looks like now and in the past. This will help them decide if treatment needs to change.

Worksheet: Patient and Wound Inspection Charts

Date:

Compared to my last dressing change . . .	BETTER	UNCHANGED	WORSE
The patient feeling . . .	Better	<input type="checkbox"/> The same	<input type="checkbox"/> Worse
The wound pain is . . .	Better	<input type="checkbox"/> The same	<input type="checkbox"/> Worse
The wound size is . . .	<input type="checkbox"/> Smaller	<input type="checkbox"/> The same	<input type="checkbox"/> Larger
The fluid (drainage) coming from the wound is . . .	<input type="checkbox"/> Less	<input type="checkbox"/> The same	More
The smell from the wound (not the dressing) is . . .	Less	<input type="checkbox"/> The same	<input type="checkbox"/> Stronger
The swelling around the wound is . . .	<input type="checkbox"/> Less	<input type="checkbox"/> The same	<input type="checkbox"/> Larger
The amount of redness around the wound is . . . (compare with the photo of the wound on the previous day)	<input type="checkbox"/> Less	<input type="checkbox"/> The same	<input type="checkbox"/> Larger

7. Apply a New Dressing

- Open the dressing package, taking care not to touch the inside of the dressing. Grasp the edge of the dressing and remove it from its package. Make sure the dressing is large enough to cover the entire wound with 2 cm to spare; no adhesive should touch the wound itself.
- If the dressing is self-adhesive (meaning it will stick to your skin on its own), remove the gauze or adhesive protector film.
- Position the dressing over the middle of the wound and gently press it into place.

- d. Gently smooth the adhesive edges down. Make sure there are no gaps where air, water or dirt might get in.
- e. If you are using a dressing that is not self-adhesive, place the dressing over the middle of the wound and use medical tape or apply a gauze wrap (wrapped loosely) to keep the dressing in place.
- f. After using any equipment (e.g., forceps, scissors, dressing tray), wash in warm, soapy, drinkable tap water or cleanse with an alcohol wipe or antibacterial surface wipe. Use this equipment only for your dressing changes. Store it in a clean, resealable plastic bag in your dressing supply container.
- g. If you are wearing clean medical gloves, remove these and place them in the garbage bag.
- h. Place any remaining garbage in the garbage bag, close the bag and dispose of it in a garbage bin.
- i. Clean your workspace with an antibacterial surface wipe. If you do not have an antibacterial surface wipe, clean the surface with a clean cloth and warm, soapy water.

8. Wash Your Hands AGAIN

Wash your hands again the way you did in Steps 2 and 4

9. Follow Up

- a. If you are changing someone else's dress, ask if they have any questions or concerns.
- b. Discuss or think about whether you need to contact a health-care professional based on what you saw and felt in Step 6. When you looked closely at the wound, was it getting better, staying the same or getting worse? If things are getting worse, contact a health-care professional as soon as possible because it may take time before seeing or talking to someone who can help.
- c. Check your supplies and get/order more if you are running low.

Module 2

Feeding Administration

The second learning module is continued with feeding administration. Forty percent of readmissions occurred within the first 30 days after discharge from the admission, with the majority reason for aspiration, septicemia, and urinary tract infection (Brito et al., 2019). Therefore, the TBI survivors with moderate and severe criteria will continue using a Nasogastric tube to administer enteral diets at home.

If you cannot eat sufficient quantities of food to meet nutritional needs, then feeding can be given through a tube into the stomach to provide adequate nutrients. Adequate nutrition depends on the right type and amount of formula. Your healthcare provider will prescribe your feeding schedule, formula and amount of water needed for optimal nutrition and hydration. After a traumatic brain injury, the metabolic rate may be increased and energy and protein needs may be high to provide nutrients for healing. Muscle atrophy is also common because of decreased mobility during this time. Calorie and protein needs tend to decrease a few months after injury, so tube feedings may need to be adjusted to avoid unwanted weight gain. It is important to monitor the body weight and know your weight goals. If you have significant weight changes (gain or loss of more than 2 lbs in 1 week) contact your nurses or doctor.

Tube Feeding Preparation

- Store the unopened products at room temperature, not in direct sunlight.
- Wash your hands prior to handling the products.
- Shake the can or bottle well and wipe the top clean prior to opening.
- Administer the feeding when the product is at room temperature.
- Cover any unused product and store in the refrigerator.
- Store the product for a maximum of 24 hours; if not used, discard the remainder.
- When administering the feeding product after it has been refrigerated, let the product warm to room temperature by setting it on the counter for about 15 minutes before putting it through the feeding tube. **Never** microwave any tube feeding product.

Supplies to Gather:

- Correct tube feeding to be delivered (can or 24 hour bottle)
- 60 ml syringe
- Graduated container
- 50 ml water
- Tube feeding (optional)

Positions for receiving tube feedings:

- **Option 1:** Propped up in bed or on a couch in a half sitting position with the head raised at least 30 degrees
- **Option 2:** Sitting up in a chair

- **Never while lying flat**

Tube Feeding Procedures

1. Wash hands.
2. Assess abdomen for distention.
3. Elevate head of bed to at least 30 degrees.
4. **Check check tube feeding residuals.**
5. Insert 60 ml syringe into port and pour feeding product into syringe.
6. Add formula to drain by gravity.
7. Add more formula until the desired amount is infused.
8. Flush with 50 ml (or amount ordered by doctor) of water.
9. Cap the tube.
10. Remain in upright position for at least one hour after feeding.
11. Rinse equipment thoroughly.

Cleaning the Tube Site and Equipment

- The site should be cleaned daily with soap and water.
- Do site care per the nurses's orders.
- Tube feeding bag may be cleaned with soap and water.
- Make sure to run the soapy water through the tubing as well.
- Tube feeding bag sets are good as long as they remain intact.
- Rinse with water to make sure all of the soap is out of the bag and the tubing.
- Syringes and canisters may be cleaned with soap and water or placed in a dishwasher on the top rack. They may also be used for as long as they remain intact.

Mouth Care:

- Good mouth care is very important, even when you're not eating or drinking.
- Brush all the surfaces of the teeth, gums and tongue at least two times a day.
- Use a soft bristled electric toothbrush if your loved one is able to tolerate the vibration. Mild toothpaste or powder is recommended.
- Use alcohol free mouthwash or a mild salt solution (1/2 teaspoon of salt in 2 cups of water), as needed to freshen breath.
- If your lips are dry, use a lanolin-based moisturizing cream to moisten lips.
- Tell your nurses if the dryness does not go away. More fluids may need to be added through the tube.
- Tell your healthcare provider if you have bleeding gums or sores.

Prevention a clogged tube:

- Flush the tube with 5 ml water between each medication.
- To prevent tube blockage, flush the tube with 30-50 ml warm water:
 - Before and after each feeding
 - Every 4 hours if the patient is receiving continuous feedings
 - After checking for stomach content residuals
- Do not mix medication with formula.
- Medication should be in liquid form when possible. If not, crush finely and make sure it is well dispersed in water.
- Give multiple medications one at a time and rinse the tube with warm water before and after.
- Open clamp when flushing, feeding or administering medications.

What do I do when I have a clogged tube?

1. Draw up warm (never hot or cold) water with plunger into the syringe, attach to feeding tube and gently work it back and forth to loosen the clog.
2. Pull out as much of the contents of the tube as you can.
3. "Milk" or massage the tube to loosen the residual.
4. Contact your healthcare provider if the clog is not released easily.

Module 3

Stress Management

Most caregivers for TBI survivors reported high levels of stress (Lieshout et al., 2020a). Stress conditions during the transition period related to the most caregivers depicted the subsequent temporary experience as full of dangers and misery since they felt deficient, reluctant, or insufficiently prepared to carry out medication anticipate patients (Mitchell et al., 2018). In addition, barriers or difficulties have been found among caregivers after discharge, including less confidence in providing care without support at home and poor availability of resources and time for consultation with the healthcare provider (Siripituphum et al., 2020).

There are some tried-and-true techniques that won't completely eliminate your stress, but can help you manage and reduce it. These techniques involve both softening the impact of stressors in your life and building up your capacity to cope with them. If you can adopt even two or three of the following suggestions, you may feel less stressed and more in control of your life.

Take time out to meditate or reflect.

Spending 10 to 20 minutes twice a day to “clear your head” can work wonders when you are feeling overburdened or overwhelmed. Some caregivers learn meditation techniques from classes, tapes, DVDs, or books on the subject, while others simply take time out to quietly reflect. Also, dzikr, prayer, and surrender to Allah Almighty can use for meditation. Whichever way you choose, it is important that you slow down and focus on clearing your mind of all the racing thoughts that may be increasing your anxiety.

Exercising is another good way to heal mind and body.

It is one of the best-known techniques for reducing stress, revitalizing energy, and maintaining your health. A brisk walk several times each week gives you significant health benefits. There are many good indoor choices, too, like yoga, jogging, walking, aerobics, dancing, and gardening.

Your library may offer exercise DVDs. Invite a friend over to join you.

Care for yourself by having regular medical check-ups.

Take medications as directed and eat healthy meals. Taking care of your body improves your emotional outlook and wellbeing.

Try to do something you enjoy every day.

Nurturing a garden, watching a favorite TV show, reading an article that interests you, or engaging in a favorite hobby can help “center” you and remind you that you still have a life outside of caregiving. Create a sanctuary by turning a room or part of a room into your cozy spot that reminds

you to relax and enjoy. You must make some time—even for 10 or 15 minutes—to take care of yourself.

Make lists of things that need to be done.

Trying to keep all your caregiving tasks in your head will leave you worrying about what you might have forgotten. Calendars and planners can also help you prioritize and keep track of your responsibilities.

Do one thing at a time.

Juggling tasks like talking on the phone, opening the mail, and cooking a meal all at the same time only adds to your stress level. Focus on one thing at a time. When one task is completed, move on to the next one.

Set limits on what you can accomplish and learn to say “no” more often.

If you feel exhausted, lower your expectations, and reexamine your priorities. You can't do everything. No one can.

Don't try to cope alone.

Maintain friendships and family relationships even if all you have time for is a weekly phone call. Join a support group where you can share experiences or talk with a counselor. Don't think you can “go it alone” in your caregiving role. Sometimes, talking about your worries can help you sort them out.

Connect online with friends and the outside world.

If you don't have a computer at home, check out your public library for access to computers and the Internet. If you are unfamiliar with how to use a computer, ask the library staff for assistance.

Keep a journal of your thoughts and feelings.

Many caregivers have found that writing their thoughts down gives them an emotional outlet and helps them find clarity in the midst of confusion.

Maintain your sense of humor.

Sometimes there is nothing left to do but laugh, and laughter is great for your mental and physical health. Seek out light-hearted or humorous books and movies. Funny things can happen even on your worst days. Try to appreciate them!

Don't shut out the good moments.

Stay open to the times when you can still enjoy certain things with or without the person you care for, such as a walk in the park or playing with grandchildren or pets. A life devoid of pleasure just drains you further and makes you more vulnerable to stress. This is a vicious cycle you can avoid.

Give yourself credit.

As a caregiver for someone with TBI's disease, you are doing the best you can. Be sure to acknowledge yourself for all the difficult things you do and let yourself feel a sense of accomplishment and satisfaction.

Ask yourself, "What am I learning from this?"

Chances are that in your caregiving journey, you have changed and developed new skills. You have crossed hurdles you thought you would never overcome. Applaud yourself for that growth.

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Siripituphum, D., Songwathana, P., Khupantavee, N., & Williams, I. (2020). Caring for thai traumatic brain injury survivors in a transitional period: What are the barriers? *Journal of Health Science and Medical Research*, 38(1), 43–52. <https://doi.org/10.31584/jhsmr.202076>

Module 4

Recognize emergency signs of traumatic brain injury

Caregivers need to understand the emergency signs of TBI survivors at home. One of the signs and symptoms is a decrease in consciousness. From data obtained from the Neurosurgery Unit of Hasan Sadikin Hospital, seven and eight patients with moderate and severe TBI underwent readmission in 2017 and 2018 with various conditions, including infection, wound dehiscence, and decreased consciousness.

If you or a family member has an injury to the head and you notice any of the symptoms of brain injury or something just isn't right, call your health care provider right away. Describe the injury and symptoms and ask if you should go to the emergency unit.

Seek Immediate Medical Attention, If Any of the Following Symptoms Occur:

- Repeated vomiting
- Worsening or severe headache
- Unable to stay awake during times you would normally be awake
- Very drowsy or cannot be awakened
- One pupil (the black part in the middle of the eye) larger than the other
- Convulsions or seizures
- Cannot recognize people or places
- Getting more and more confused, restless, or agitated
- Difficulty walking, with balance or decreased coordination
- Difficulty with vision
- Slurred speech
- Unusual behavior
- Loss of consciousness (a brief loss of consciousness should be taken seriously and the person should be carefully monitored)
- Any symptom that concerns you

Module 5

Know the Signs and Symptoms of Wound Infection

Caregivers need to understand the signs of infection in the craniotomy wound. From data obtained from the Neurosurgery Unit of Hasan Sadikin Hospital, seven and eight patients with moderate and severe TBI underwent readmission in 2017 and 2018 with various conditions, including craniotomy wound infection, wound dehiscence, and decreased consciousness.

A break in the skin through injury or surgery creates an open entry for bacteria to enter the body and begin to multiply. You should call the health care professional. Here are some of the most common signs and symptoms associated with a wound infection:

1. Fever

After surgery, it is common for patients to run a low-grade fever of under 37.5 degrees Celcius. However, if the fever goes to 37.5 degrees Celcius or above and persists, that can indicate a possible wound infection. Patients who are running a fever may also have headaches and decreased appetite. This fever will be accompanied by changes in the condition of the surgical wound according to the table observed in module 1.

2. Feeling of Overall Malaise

Asking a patient how they feel can be an important part of assessing for wound infection. Individuals recovering from surgery or injury should feel better every day. When they do not and have continuing or worsening feelings of fatigue and lack of energy, this can be an indication that they have a localized or systemic infection. Sometimes patients recovering from surgery who develop an infection may feel better for a while and then suddenly feel much worse.

3. Green, Tan, or Pungent Drainage

Normally, incisions or wounds drain clear or have slightly yellow exudate. Healthy wound drainage can be managed with dressings or negative pressure therapy. If the drainage becomes purulent with a pungent or foul odor it can indicate an infection.

4. Increased Pain in Wound

Generally, a patient who is healing well from surgery or an injury should find that their pain is subsiding. Although they may need pain medication at first, they should be able to reduce the use of medication and finally discontinue it comfortably over time. If a patient has continual or increasing pain, that can be a symptom of wound infection. Asking a patient about their pain level periodically and keeping track of their use of pain medication can help identify an underlying infection.

5. Redness Around the Wound

Initially, wounds appear slightly red because of the natural inflammatory process of healing, but that redness should gradually decrease in approximately 5-7 days. A deeper redness around the wound that continues to expand and worsen is a sign of wound infection. You can track whether redness is expanding by taking photos or drawing a line around the red area with a marker and checking to see whether the redness extends past the line.

6. Swelling of Wounded Area

Like redness, swelling is normal at the beginning stages of wound healing. However, swelling should be continually decreasing. Persistent swelling could be a further sign of infection or other complications.

7. Warmer Skin Surrounding Wound

Although it can be normal for skin surrounding a wound to feel somewhat warmer, when the skin around the incision feels very warm to the touch and doesn't start cooling down, that can indicate that the body is mounting a campaign against an infection.

8. Loss of Function and Movement

Another signal of wound infection that may require treatment is when the patient has lost the ability to move the wounded area normally. It can be common to have burning, numbness, or tingling around the wound when the patient tries to move, but they should be able to move the wounded area without a great deal of difficulty or pain.

Module 6

Arrange a schedule for the care of TBI survivors at home

Most caregivers for TBI survivors reported high levels of burden when caring for TBI survivors at home (Lieshout et al., 2020). arranging a schedule to care for patients at home is allegedly able to reduce the burden on the caregiver.

	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
6am-8am							
8am-10am							
10am-12pm							
12pm-2pm							
2pm-4pm							
4pm-6pm							
6pm-8pm							
8pm-10pm							

**CONTACT PERSON
COMMUNITY HEALTH CENTERS**

NO	NAMA PUSKESMAS	NAMA KECAMATAN	ALAMAT PUSKESMAS	NO TLP
1	UPT Puskesmas Sukarasa	Sukasari	Jl.Gegerkalong Hilir no 157 Bandung	70722632
2	Puskesmas Ledeng	Sukasari	Jl Sersan bajuri no 2 Bandung	71173669
3	Puskesmas Karangsetra	Sukasari	Jl Ir Sutami no 40 Bandung	2013079
4	Puskesmas Sarijadi	Sukasari	Jl Sari Asih no 76 Bandung	70722591
5	UPT Puskesmas Sukajadi	Sukajadi	Jl Sukagalih no 26 Bandung	70722590
6	Puskesmas Sukawarna	Sukajadi	Jl Cibogo no 76 Bandung	2009464
7	UPT Puskesmas Pasirkaliki	Cicendo	Jl Pasirkaliki no 88 Bandung	4206531
8	Kepala UPT Puskesmas Garuda	Andir	Jl Dadali no 81 Bandung	6013885
9	Kepala Puskesmas Babatan	Andir	Jl Ence Azis no 4 Bandung	4263746
10	UPT Puskesmas Ciumbuleuit	Cidadap	Jl Bukit resik no I Bandung	2032459
11	Puskesmas Cipaku	Cidadap	Jl Cipaku Indah IV Bandung	70722586
12	UPT Puskesmas Puter	Coblong	Jl Puter no 3 Bandung	2500334 / 2509292
13	Puskesmas Dago	Coblong	Jl Ir H Juanda no 360 Bandung	2533539
14	Puskesmas Sekeloa	Coblong	Jl Tubagus Ismail Bawah no 4 Bandung	2511299
15	Puskesmas Cikutra Lama	Coblong	jl Cikutra no 5 Bandung	2531883
16	UPT Puskesmas Salam	Bandung Wetan	Jl Salam no 2 Bandung	7234610
17	Puskesmas Taman Sari	Bandung Wetan	Jl Kebon Bibit utara II Bandung	
18	Kepala UPT Puskesmas Tamblong	Sumur Bandung	Jl Tamlong no 66 Bandung	4264415
19	Puskesmas Balai Kota	Sumur Bandung	Jl Wastukencana no 2 Bandung	4232338 ps 315
20	UPT Puskesmas Neglasari	Cibeunying Kaler	Jl Cikutra Timur Bandung	70722595
21	UPT Puskesmas Padasuka	Cibeunying Kidul	Jl Padasuka no 3 Bandung	7272113
22	Puskesmas Pasirlayung	Cibeunying Kidul	Jl Padasuka no 146 Bandung	7202580
23	UPT Puskesmas Babakan Sari	Kiaracondong	Jl Babakan Sari no 184	7270793

			Bandung	
24	Puskesmas Babakan Surabaya	Kiaracondong	Jl Soma no 25 Bandung	7210377
25	UPT Puskesmas Ibrahim Aji	Batununggal	Jl Kiaracondong no 88 Bandung	7208355
26	Puskesmas Ahmad Yani	Batununggal	Jl Cianjur no 23 Bandung	7231407
27	Puskesmas Gumuruh	Batununggal	Jl Ranca Goong no 11 Bandung	7330610
28	UPT Puskesmas Talagabodas	Lengkong	Jl Talaga Bodas no 35 Bandung	7310550
29	Puskesmas Suryalaya	Lengkong	Jl Suryalaya I no 7 Bandung	7314952
30	Puskesmas Cijagra Baru	Lengkong	Jl Cijagra I no 28 Bandung	7303420
31	Puskesmas Cijagra Lama	Lengkong	Jl Buah batu no 275 Bandung	7302748
32	UPT Puskesmas Pasundan	Regol	Jl Pasundan no 99 Bandung	4236286
33	Puskesmas M. Ramdhan	Regol	Jl M Ramdhan no 108 Bandung	5210562
34	Puskesmas Pasirluyu	Regol	Jl Sukaati Bandung	7271861
35	UPT Puskesmas Pagarsih	Astana Anyar	Jl Pagarsih no 95 Bandung	6013212
36	Puskesmas Astana Anyar	Astana Anyar	Jl Pajagalan no 72 Bandung	
37	Puskesmas Lio Genteng	Astana Anyar	Jl Lio Genteng Bandung	5232166
38	Puskesmas Pelindung Hewan	Astana Anyar	Jl Pelindung Hewan Bandung	5227028
39	UPT Puskesmas Cetarip	Bojongloa Kaler	Jl Cetarip Barat Bandung	5422571
40	Puskesmas Sukapakir	Bojongloa Kaler	Jl Pagarsih Gg Pak Oyon .no 27 Bandung	70722593
41	UPT Puskesmas Kopo	Bojongloa Kidul	Jl Kopo no 369 Bandung	70722596
42	UPT Puskesmas Caringin	Babakan Ciparay	Jl Caringin no 103 Bandung	5432275
43	Puskesmas Cibolerang	Babakan Ciparay	Jl Cibolerang Bandung	5423822
44	Puskesmas Sukahaji	Babakan Ciparay	Jl H Zakaria Bandung	6026075
45	Kepala Puskesmas Cijerah	Bandung Kulon	Jl Melong Asih Bandung	6022029
46	UPT Puskesmas Cibuntu	Bandung Kulon	Jl Sah Bandar no I Bandung	6021597

**CONTACT PERSON
SOCIAL SERVICES**

No	Dinas	Telepon	Alamat
1	Dinas Sosial	-	Jl. MT Haryono, Lemah abang Wetan, Lemahabang, Cirebon, Jawa Barat 45183
2	Dinas Sosial	(022) 6643149	Jl. Jend. H. Amir Machmud No.331, Cibabat, Cimahi Tengah, Kota Cimahi, Jawa Barat
3	Dinas Sosial	(0251) 8332315	Jalan Raya Merdeka No.142, Ciwaringin, Bogor Tengah, Ciwaringin, Bogor Tengah, Kota Bogor, Jawa Barat 16125
4	Dinas Sosial	(021) 88349600	Jl. Ir. H. Juanda No.157B, Margahayu, Bekasi Tim., Kota Bks, Jawa Barat 17113
5	Dinas Sosial	-	Banjar, Kota Banjar, Jawa Barat 46311
6	Dinas Sosial	(022) 2013139	Jl. Sindang Sirna No.40, Gegerkalong, Sukasari, Kota Bandung, Jawa Barat 40153
7	Dinas Sosial	0261) 201309	Jl. Pangeran Kornel No.117, Pasanggrahan Baru, Sumedang Sel., Kabupaten Sumedang, Jawa Barat 45311
8	Dinas Sosial		Sukamanah, Cisaat, Sukamanah, Kec. Sukabumi, Sukabumi, Jawa Barat 43152
9	Dinas Sosial	(0260) 411425	JL. D.I. Panjaitan, No. 81, Soklat, Karanganyar, Kec. Subang, Kabupaten Subang, Jawa Barat 41211
10	Dinas Sosial	(0233) 281122	Jl. Raya K H Abdul Halim No.499, Tonjong, Kec. Majalengka, Kabupaten Majalengka, Jawa Barat 45414
11	Dinas Sosial	-	
12	Dinas Sosial	-	Jl. Husni Hamid No.3, Nagasari, Karawang Bar., Kabupaten Karawang, Jawa Barat 41312
13	Dinas Sosial	-	Jl. Raya Pabean Udik, Pabeanudik, Kec. Indramayu, Kabupaten Indramayu, Jawa Barat 45219
14	Dinas Sosial	-	Unnamed Road, Sumber, Cirebon, Jawa Barat 45611
15	Dinas Sosial	(0263) 262464	Jl. Raya Bandung No.6, Bojong, Karangtengah, Kabupaten Cianjur, Jawa Barat 43281
16	Dinas Sosial	(0265) 771096	Jl. Tentara Pelajar No. 1-3, Ciamis, Kec. Ciamis, Kabupaten Ciamis, Jawa Barat 46211
17	Dinas Sosial		Tengah, Cibinong, Bogor, Jawa Barat 16914
18	Dinas Sosial	0897-8101-269	Sukamahi, Cikarang Pusat, Bekasi, Jawa Barat 17530
19	Dinas Sosial		Mekarsari, Ngamprah, Kabupaten Bandung Barat, Jawa Barat 40552
20	Dinas Sosial	(022) 5893326	Jl. Raya KM. 17, 40911, Pamekaran, Soreang, Bandung, Jawa Barat 40912

Innovative transitional care program display on Android

 <p>Selamat Datang di aplikasi M-Health</p> <p>Silahkan masuk terlebih dahulu.</p> <p>Email</p> <p>Password</p> <p>Masuk</p> <p>Belum punya akun? Daftar sebagai Caregiver!</p>	<p>Welcome, Amelia Ganefianty</p>  <ol style="list-style-type: none">1. Manajemen Perawatan Luka Di Rumah2. Manajemen Pemberian Nutrisi3. Manajemen Stres4. Mengenal Tanda-tanda <p>Dashboard</p>	<p>← Modul 1</p>  <p>Manajemen Perawatan Luka Di Rumah</p> <p>1. Persiapkan Diri Anda dan Perbekalan Anda</p> <ol style="list-style-type: none">a. Pilih lokasi di rumah Anda untuk melakukan penggantian balutan. Lokasi harus memiliki pencahayaan yang baik, ruang yang memadai, akses ke air mengalir, permukaan yang keras seperti meja (bukan lantai atau tempat tidur).b. Anda harus nyaman saat melakukan perawatan luka. Nyalakan lampu di ruang kerja Anda, matikan semua kipas angin dan tutup semua jendela.c. Tempatkan kantong sampah di dekat Anda.d. Bersihkan permukaan keras yang Anda pilih (misalnya, meja) dengan lap permukaan antibakteri. Jika Anda tidak memiliki lap permukaan antibakteri, bersihkan permukaan
<p>← Modul 2</p>  <p>Manajemen Pemberian Nutrisi</p> <p>Jika pasien Anda tidak dapat mengonsumsi makanan dalam jumlah yang cukup untuk memenuhi kebutuhan nutrisi, maka pemberian makanan dapat diberikan melalui selang ke dalam lambung untuk memberikan nutrisi yang cukup. Nutrisi yang cukup tergantung pada jenis dan jumlah susu formula yang tepat. Penyedia layanan kesehatan Anda akan meresepkan jadwal makan Anda, formula dan jumlah air yang dibutuhkan untuk nutrisi dan hidrasi yang optimal.</p> <p>Setelah cedera otak traumatis, tingkat metabolisme dapat meningkat dan kebutuhan energi dan protein mungkin tinggi untuk menyediakan nutrisi untuk penyembuhan. Atrofi otot juga sering terjadi karena penurunan mobilitas selama waktu ini. Kebutuhan kalori dan protein cenderung menurun beberapa bulan setelah cedera, jadi pemberian makanan melalui selang mungkin perlu disesuaikan untuk</p>	<p>← Modul 4</p> <p>Mengenal Tanda-tanda Kegawatdaruratan</p> <p>Jika anggota keluarga mengalami cedera di kepala dan Anda melihat salah satu gejala cedera otak atau ada sesuatu yang tidak beres, segera hubungi penyedia layanan kesehatan Anda. Jelaskan cedera dan gejalanya dan tanyakan apakah Anda harus pergi ke unit gawat darurat.</p> <p>Cari Perhatian Medis Segera, Jika Salah Satu Gejala Berikut Terjadi:</p> <ul style="list-style-type: none">◦ Muntah berulang◦ Sakit kepala yang memburuk atau parah◦ Tidak dapat tetap terjaga pada saat pasien Anda biasanya terjaga◦ Sangat mengantuk atau tidak bisa dibangunkan◦ Satu pupil (bagian hitam di tengah mata) lebih besar dari yang lain◦ Kejang◦ Tidak dapat mengenali orang atau tempat◦ Semakin bingung, gelisah, atau gelisah◦ Kesulitan berjalan, dengan keseimbangan atau penurunan koordinasi◦ Kesulitan dengan penglihatan◦ Perilaku yang tidak biasa◦ Kehilangan kesadaran (kehilangan kesadaran yang singkat harus ditanggapi dengan serius dan orang tersebut harus dipantau dengan cermat)◦ Gejala apa pun yang mengkhawatirkan Anda	<p>← Modul 5</p>  <p>INFEKSI PADA LUKA OPERASI</p> <p>Mengenal Tanda-tanda Infeksi</p> <p>Sebuah luka di kulit akibat cedera atau operasi menciptakan jalan masuk terbuka bagi bakteri untuk masuk ke dalam tubuh dan mulai berkembang biak. Anda harus menghubungi profesional perawatan kesehatan. Berikut adalah beberapa tanda dan gejala paling umum yang terkait dengan infeksi luka:</p> <ol style="list-style-type: none">1. Demam<p>Setelah operasi, biasanya pasien mengalami demam ringan di bawah 37,5 derajat Celcius. Namun, jika demam mencapai 101 atau lebih dan terus berlanjut, itu bisa mengindikasikan kemungkinan infeksi luka. Pasien yang mengalami demam mungkin juga mengalami sakit kepala dan nafsu makan berkurang.</p>2. Perasaan Malaise Secara Keseluruhan

NO	GROUP	PATIENT	AGE	GCS	DIAGNOSIS	CAREGIVER	SEX	AGE	EDUCATION	RELATION	INCOME	TELP	DATE OF RECRUITMENT	DATE OF DISCHARGE	SCORE READINESS ADMITTED	SCORE READINESS DISCHARGE	STRESS DISCHARGE	STRESS 2 WEEKS	STRESS 1 MONTH	BURDEN DISCHARGE	BURDEN 2 WEEKS	BURDEN 1 MONTH
1	Intervention	Tn. Asep	32	13	moderate HI	Pipit Fitria L	F	27	SMP	Wife	4.000.000	085724820357	11/1/2023	21/1/23	15	21	47	33	18	26	20	10
2	Intervention	Tn. Aco	63	13	moderate HI	Eti Sopiati	F	53	SMP	Wife	5.000.000	089530056683	11/1/2023	25/1/23	13	25	39	30	20	31	21	11
3	Control	Tn. Solihin	19	13	moderate HI	Irah	F	55	SD	Wife	4.000.000	087822498333	11/1/2023	18/1/23	13	24	39	32	30	21	20	22
4	Control	Ny. Fitriani	19	12	moderate HI	Salim	M	48	SMA	Father	4.500.000	08356554321	12/1/2023	19/1/23	13	21	41	38	40	21	20	20
5	Intervention	Ny. Halimah	62	12	moderate HI	Widiawati	F	37	SMA	Children	5.000.000	081809695304	12/1/2023	15/1/23	12	20	31	24	20	21	15	12
6	Control	Tn. Dedi	52	12	moderate HI	Agus	M	37	SMA	Children	5.000.000	082127171752	13/1/2023	15/1/23	12	17	35	32	33	22	24	30
7	Control	Tn. Bowo	21	11	severe HI	Ida	F	60	SMA	Mother	4.000.000	089923308752	13/1/2023	19/01/2023	11	12	40	38	37	21	22	24
8	Control	Tn. Agung	22	12	moderate HI	Nani	F	40	SMP	Mother	3.000.000	085352737191	17/1/2023	21/01/2023	12	24	30	31	31	18	20	24
9	Intervention	Tn.M.Revaldi	23	14	moderate HI	Ipah Masripah	F	48	SMA	Mother	4.700.000	085217118502	17/1/2023	20/1/2023	12	22	29	28	24	20	18	15
10	Control	Ny. Lim	70	13	moderate HI	Erni	F	38	S1	Children	3.400.000	085294887629	19/1/2023	23/1/2023	11	22	27	27	26	20	22	20
11	Intervention	Tn. Iman	39	13	severe HI	Irni	F	37	SMA	Wife	4.000.000	082134696683	19/1/2023	23/1/2023	11	24	28	22	20	18	14	12
12	Intervention	Tn. Andre	18	12	severe HI	Dewi Ratih	F	38	SMP	Mother	8.000.000	081925470589	24/1/2023	28/1/2023	8	23	28	24	18	22	15	10
13	Intervention	Ny.Rini	23	13	moderate HI	Entin Kartini	F	52	SD	Mother	4.000.000	088222442779	24/1/2023	30/1/2023	11	24	27	22	18	19	14	10
14	Control	Tn. Kiki	23	12	moderate HI	Jahidin	M	50	SMP	Father	7.300.000	081395473344	24/1/2023	30/1/2023	8	13	31	28	30	19	20	21
15	Intervention	Tn. Fazri	25	13	moderate HI	Lina	F	48	SMA	Mother	4.900.000	087839406359	24/1/2023	30/1/2023	14	24	23	22	20	13	14	12
16	Intervention	Nn. Nabila	19	13	moderate HI	Nonoy	F	47	SMA	Mother	4.600.000	0895361537895	24/1/2023	29/1/2023	14	24	23	24	18	13	15	10
17	Intervention	Nn. Ayu	18	13	moderate HI	Sri P	F	53	SMP	Aunt	5.400.000	08162448445	24/1/2023	29/1/2023	10	20	32	22	18	17	14	10
18	Control	Tn. Gilang	19	13	moderate HI	Ai Masitoh	F	45	SMP	Mother	9.000.000	082118144431	24/1/2023	29/1/2023	10	16	39	35	34	22	20	20
19	Intervention	Tn. Adjie	23	13	moderate HI	Yuyun Yuningsih	F	47	D1	Mother	4.200.000	083152432897	25/1/2023	30/1/2023	14	22	35	22	20	19	14	12
20	Intervention	Tn. Dadan	43	12	severe HI	Yanti Komalasar	F	41	SMA	Wife	4.000.000	081573456909	31/1/2023	3/2/2023	13	20	32	24	18	18	15	10
21	Intervention	Tn. Anugerah	21	13	moderate HI	Imas Maesaroh	F	56	SD	Wife	4.000.000	087820086369	2/2/2023	6/2/2023	10	11	40	22	18	23	14	10
22	Control	Tn. Pyeer	18	12	severe HI	Andi Riadi	M	32	SMP	Sister	1.000.000	081210283766	6/2/2023	11/2/2023	9	12	38	28	30	28	20	21
23	Control	Tn. Budi	41	13	moderate HI	Entin	F	40	SMP	Wife	4.000.000	081394322622	6/2/2023	11/2/2023	8	11	37	27	26	28	22	27
24	Intervention	Tn. Syamsuar	58	12	moderate HI	Yusmaniar	F	51	SMP	Wife	3.600.000	081214805655	6/2/2023	11/2/2023	10	18	32	20	18	18	14	12
25	Intervention	Tn. Diaz	22	12	moderate HI	Andri Rianto	M	35	SMA	Brother	3.400.000	08724443518	7/2/2023	12/2/2023	10	11	33	27	16	23	15	13
26	Control	Tn. Rifki	25	13	moderate HI	Tari Adli	F	23	SMP	Wife	2.100.000	085691420588	7/2/2023	12/2/2023	11	13	37	28	30	24	20	21
27	Control	Tn. Wahab	36	12	moderate HI	Meiwarti	F	35	SMA	Wife	3.500.000	08122103761	8/2/2023	15/2/2023	8	12	38	27	26	26	26	27
28	Control	Tn. Agung	43	13	moderate HI	Lita Nurtita	F	40	SMP	Wife	5.000.000	08999499423	8/2/2023	15/2/2023	10	12	37	30	29	24	25	20
29	Intervention	Tn. Ahmad	45	13	moderate HI	Anisa	F	40	SMA	Wife	4.000.000	08382230725	10/2/2023	15/02/202	8	15	28	22	20	18	14	12

											0		3									
30	Control	Tn. Gilman	44	13	moderate HI	Lina Tini	F	41	SMA	Wife	1.000.000	08223490997	17/2/2023	21/02/2023	8	12	32	28	30	24	20	21
31	Intervention	Tn. Diki	45	13	moderate HI	Tuti Patimah	F	44	SMA	Wife	3.000.000	082115060082	18/2/2023	23/2/2023	10	16	28	24	18	18	15	10
32	Intervention	Tn. M. Yusuf	23	12	severe HI	Kusmiati	F	60	SMP	Mother	6.000.000	089646443269	20/2/2023	25/2/2023	10	17	27	22	18	19	14	10
33	Control	Tn. Alwal	19	13	moderate HI	Mimin	F	51	SD	Mother	5.800.000	08328872601	20/2/2023	25/2/2023	9	12	28	27	28	22	22	21
34	Control	Tn. M. Aprijal	18	12	severe HI	Siti Patimah	F	55	SMP	Mother	4.000.000	08778764435	20/2/2023	25/2/2023	10	11	32	30	31	24	24	21
35	Intervention	Ny. Ratiah	45	12	severe HI	Nining	F	43	SMA	Other	4.700.000	087794881260	20/2/2023	25/2/2023	10	16	24	20	15	20	18	13
36	Intervention	Tn. lin	45	12	moderate HI	Susi Susilawati	F	40	SMP	Mother	5.000.000	082126119940	20/2/2023	25/2/2023	11	17	26	22	17	19	17	14
37	Control	Ny. Miah	70	11	severe HI	Susiana	F	50	SMP	Children	3.500.000	083822490728	20/2/2023	26/2/2023	9	11	34	30	31	22	22	21
38	Intervention	Tn. Gugun	18	13	moderate HI	Tuti	F	38	SD	Mother	3.800.000	085798068068	22/2/2023	26/2/2023	8	16	27	20	18	18	14	12
39	Intervention	Tn. Satria	18	13	moderate HI	Nazila	F	42	SMP	Mother	4.800.000	082128998995	22/2/2023	26/2/2023	10	16	28	27	16	19	15	13
40	Control	Tn. Kocin	52	13	moderate HI	Neni	F	46	SMA	Wife	2.000.000	083244578690	24/2/2023	30/2/2023	9	17	33	27	26	24	26	27
41	Control	Tn. Slamet	57	13	moderate HI	Ratini	F	50	SD	Mother	4.000.000	083822490877	24/2/2023	30/2/2023	8	12	34	30	29	25	25	20
42	Intervention	Tn. Ase	32	12	severe HI	Cucuwati	F	24	SMP	Wife	4.000.000	085722256640	24/2/2023	30/2/2023	9	15	28	22	18	18	16	14
43	Control	Tn. Aay	22	13	moderate HI	Melia	F	50	SMA	Mother	2.000.000	085720089986	2/3/2023	5/3/2023	8	12	32	27	26	22	26	27
44	Control	Tn. Riki	24	13	moderate HI	Cicih	F	51	SMA	Mother	4.000.000	081210218988	2/3/2023	6/3/2023	9	13	30	30	29	22	25	20
45	Intervention	Nn. Chyntia	20	13	moderate HI	Wati	F	52	SMA	Mother	4.000.000	083127564860	2/3/2023	6/3/2023	10	16	23	22	18	18	14	10
46	Intervention	Tn. Sri Panca	18	13	moderate HI	Estin	F	54	S1	Mother	5.300.000	081223437372	2/3/2023	6/3/2023	10	17	28	20	15	17	12	10
47	Intervention	Tn. Cucu	37	12	moderate HI	Ratna	F	31	SD	Wife	2.000.000	085846001879	2/2/2023	7/3/2023	8	16	27	20	14	19	15	11
48	Control	Ny. Ijhan	32	13	moderate HI	Mamat	M	35	SMA	Husband	4.000.000	08762298716	3/3/2023	9/3/2023	9	17	30	28	30	22	26	27
49	Control	Tn. Omin	59	13	moderate HI	Eti B	F	51	SD	Wife	4.000.000	08734557056	7/3/2023	12/3/2023	9	13	32	27	26	24	25	20
50	Intervention	Tn. Mamat	69	13	moderate HI	Neni S	F	35	SD	Children	4.000.000	08119977274	7/3/2023	12/3/2023	9	16	30	20	15	20	15	11
51	Control	Tn. Econ	55	13	moderate HI	Bubun	F	52	SD	Wife	2.300.000	083822490888	8/3/2023	13/3/2023	8	12	34	27	26	25	25	20
52	Intervention	Tn. Nanang	54	13	moderate HI	Ade W	F	52	SD	Wife	3.700.000	089654574192	14/3/2023	18/3/2023	8	16	24	24	18	22	18	13
53	Intervention	Tn. Restu	18	13	moderate HI	Dadang	M	55	SMA	Father	4.000.000	081221120882	14/3/2023	18/3/2023	10	18	22	22	18	18	17	14
54	Control	Ny. Suratmi	75	13	moderate HI	Tinah	F	45	SMP	Children	4.000.000	08775446798	19/3/2023	23/3/2023	8	12	30	28	26	24	18	12
55	Intervention	Tn. Chandra	26	12	moderate HI	Nelly Susanti	F	26	SMA	Wife	5.000.000	082117178602	20/3/2023	25/3/2023	8	16	24	20	15	17	15	11
56	Control	Ny. Sari	59	13	moderate HI	Ahmad	M	60	SMA	Husband	6.500.000	087765429872	20/03/2023	14/3/2023	8	12	32	28	30	32	20	21
57	Control	Tn. Dadan	31	12	moderate HI	Lita s	F	30	SMP	Wife	3.400.000	08999499455	20/03/2023	15/3/2023	9	13	30	27	26	28	26	27
58	Control	Tn. Nurrizal	32	13	moderate HI	Dini	F	30	SMA	Wife	4.000.000	083822490888	20/03/2023	2/3/2023	9	17	30	30	29	27	25	20

59	Control	Tn. Rama	21	12	moderate HI	Lani	M	48	SMA	Mother	2.800.000	083820001555	21/03/2023	3/3/2023	9	13	32	28	25	25	23	20
60	Control	Ny. Iroh	49	11	severe HI	Sinta	M	38	SMA	Children	4.000.000	08567724451	21/03/2023	4/3/2023	8	12	34	32	28	26	24	22
61	Intervention	Tn. Mahmud	48	13	moderate HI	Fatma	F	46	SMA	Wife	3.300.000	081317064746	22/03/2023	30/03/2023	10	18	22	20	15	28	12	12
62	Control	Tn. Slamet	51	13	moderate HI	Siska	F	49	SMP	Wife	4.000.000	081210283786	22/03/2023	30/03/2023	8	12	34	28	25	30	22	22
63	Intervention	Tn. Satrio	37	12	severe HI	Mimi	F	35	SMA	Wife	3.500.000	081385660761	22/03/2023	1/4/2023	8	16	24	28	14	23	14	12
64	Control	Ny. Rika	39	13	moderate HI	Tono	M	42	SMA	Husband	4.900.000	0899499456	23/03/2023	31/03/2023	11	12	40	27	26	30	23	20
65	Control	Tn. Rizky	42	13	moderate HI	Yasih	F	40	SMA	Wife	3.000.000	083822490887	23/03/2023	1/4/2023	12	24	30	30	29	32	24	22
66	Intervention	Tn. Solihin	39	13	moderate HI	Anita	F	35	SMA	Husband	4.000.000	083838485311	23/03/2023	2/4/2023	8	16	24	20	15	20	13	12
67	Control	Ny. Sari	44	11	severe HI	Momon	M	48	SMA	Husband	6.500.000	081210283766	24/03/2023	2/4/2023	8	11	37	28	25	27	23	20
68	Intervention	Ny. Tiktik	45	13	moderate HI	Mizan	M	50	SMA	Husband	4.000.000	083176285234	24/03/2023	3/3/2023	10	18	32	22	18	21	17	14
69	Control	Ny. Diah	48	13	moderate HI	Lina	F	45	SMP	Brother	5.000.000	087855241716	25/03/2023	4/4/2023	8	13	31	28	26	25	18	12
70	Intervention	Ny. Halimah	50	13	moderate HI	Maman	M	52	SMP	Husband	4.000.000	0895615731360	25/03/2023	5/4/2023	14	24	23	20	15	20	15	11
71	Control	Tn. Dion	48	13	moderate HI	Tita	F	44	SMA	Wife	3.800.000	085620089986	25/03/2023	4/4/2023	12	24	30	32	28	22	24	22
72	Intervention	Tn. Saeful Hadi	37	13	moderate HI	Metty	F	34	SMA	Wife	4.000.000	083898838060	26/03/2023	3/4/2023	12	22	29	20	15	21	12	12
73	Control	Tn. Kamil	40	13	moderate HI	Yani	F	38	SMA	Wife	4.000.000	081210283783	26/03/2023	5/4/2023	13	21	41	28	25	28	22	22
74	Intervention	Tn. Ayip	45	13	moderate HI	Yayah	F	47	SMA	Wife	4.000.000	085863280917	27/03/2023	5/4/2023	12	20	31	22	18	18	12	10

RESULTS OF SPSS ANALYSIS

PATIENTS OF TBI

AGE

EXPERIMENT GROUP

NORMALITY TEST

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Age_patientI	.172	37	.007	.909	37	.005

a. Lilliefors Significance Correction

FREQUENCY TEST

Statistics

Age_patientI

N	Valid	37
	Missing	0
Mean		35.22
Median		37.00
Std. Deviation		14.920
Skewness		.499
Std. Error of Skewness		.388
Minimum		18
Maximum		69

CONTROL GROUP

NORMALITY TEST

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Age_patientC	.149	37	.056	.927	37	.058

a. Lilliefors Significance Correction

FREQUENCY TEST

Statistics

Age_patientC		
N	Valid	37
	Missing	0
Mean		38.89
Median		40.00
Std. Deviation		16.648
Skewness		.387
Std. Error of Skewness		.388
Minimum		18
Maximum		75

HOMOGENEITY TEST

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Age_patient	Equal variances assumed	.457	.501	1.000	72	.321	3.676	3.675	-3.651	11.002
	Equal variances not assumed			1.000	71.153	.321	3.676	3.675	-3.652	11.004

**GENDER TBI SURVIVORS
EXPERIMENT GROUP**

Gender_patientI

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	29	78.4	78.4	78.4
	Female	8	21.6	21.6	100.0
	Total	37	100.0	100.0	

CONTROL GROUP

Gender_patientC

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	27	73.0	73.0	73.0
	Female	10	27.0	27.0	100.0
	Total	37	100.0	100.0	

HOMOGENEITY TEST

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.021 ^a	1	.884		
Continuity Correction ^b	.000	1	1.000		
Likelihood Ratio	.022	1	.883		
Fisher's Exact Test				1.000	.633
Linear-by-Linear Association	.021	1	.886		
N of Valid Cases	37				

a. 1 cells (25.0%) have expected count less than 5. The minimum expected count is 2.16.

b. Computed only for a 2x2 table

**DIAGNOSIS TBI SURVIVORS
EXPERIMENT GROUP**

Diagnosis_I

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Moderate HI	30	81.1	81.1	81.1
	Severe HI	7	18.9	18.9	100.0
	Total	37	100.0	100.0	

CONTROL GROUP

Diagnosis_C

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Moderate HI	31	83.8	83.8	83.8
	Severe HI	6	16.2	16.2	100.0
	Total	37	100.0	100.0	

HOMOGENEITY TEST

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.671 ^a	1	.196		
Continuity Correction ^b	.523	1	.470		
Likelihood Ratio	2.775	1	.096		
Fisher's Exact Test				.571	.255
Linear-by-Linear Association	1.626	1	.202		
N of Valid Cases	37				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.14.

b. Computed only for a 2x2 table

CAREGIVERS

AGE

EXPERIMENT GROUP

NORMALITY TEST

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Age_int	.114	37	.200*	.965	37	.287

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

FREQUENCY TEST

Statistics

Age_int

N	Valid	37
	Missing	0
Mean		43.38
Median		44.00
Std. Deviation		9.121
Variance		83.186
Skewness		-.314
Std. Error of Skewness		.388
Minimum		24
Maximum		60
Percentiles	25	36.00
	50	44.00
	75	52.00

**CONTROL GROUP
NORMALITY TEST**

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Age_co	.110	37	.200*	.978	37	.655

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

FREQUENCY TEST

Statistics

Age_co		
N	Valid	37
	Missing	0
Mean		44.11
Median		45.00
Std. Deviation		8.435
Variance		71.155
Skewness		-.316
Std. Error of Skewness		.388
Minimum		23
Maximum		60
Percentiles	25	38.00
	50	45.00
	75	50.00

HOMOGENEITY TEST

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Age	Equal variances assumed	.616	.435	.357	72	.722	.730	2.042	-3.342	4.801
	Equal variances not assumed			.357	71.565	.722	.730	2.042	-3.342	4.802

**GENDER
EXPERIMENT GROUP**

		Gender_int			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	4	10.8	10.8	10.8
	Female	33	89.2	89.2	100.0
	Total	37	100.0	100.0	

CONTROL GROUP

		Gender_co			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	8	21.6	21.6	21.6
	Female	29	78.4	78.4	100.0
	Total	37	100.0	100.0	

HOMOGENEITY TEST

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.030 ^a	1	.862		
Continuity Correction ^b	.000	1	1.000		
Likelihood Ratio	.029	1	.864		
Fisher's Exact Test				1.000	.640
Linear-by-Linear Association	.029	1	.864		
N of Valid Cases	37				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is .86.

b. Computed only for a 2x2 table

**RELATIONSHIP WITH PATIENT
EXPERIMENT GROUP**

		Relationship_in			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Husband/wife	18	48.6	48.6	48.6
	Children	2	5.4	5.4	54.1
	Parent	13	35.1	35.1	89.2
	Sibling	2	5.4	5.4	94.6
	Other	2	5.4	5.4	100.0
	Total	37	100.0	100.0	

CONTROL GROUP

		Relationship_co			
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Husband/wife	19	51.4	51.4	51.4
	Children	5	13.5	13.5	64.9
	Parent	11	29.7	29.7	94.6
	Sibling	2	5.4	5.4	100.0
	Total	37	100.0	100.0	
Total		74	100.0	100.0	

HOMOGENEITY TEST

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	10.903 ^a	12	.537
Likelihood Ratio	11.375	12	.497
Linear-by-Linear Association	3.119	1	.077
N of Valid Cases	37		

a. 17 cells (85.0%) have expected count less than 5. The minimum expected count is .11.

**EDUCATION
EXPERIMENT GROUP**

Education_in

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low	15	40.5	40.5	40.5
	Moderate	20	54.1	54.1	94.6
	High	2	5.4	5.4	100.0
	Total	37	100.0	100.0	

CONTROL GROUP

Education_co

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Low	15	40.5	40.5	40.5
	Moderate	19	51.4	51.4	91.9
	High	3	8.1	8.1	100.0
	Total	37	100.0	100.0	

HOMOGENEITY TEST

Chi-Square Tests

	Value	df	Asymptotic Significance (2- sided)
Pearson Chi-Square	3.479 ^a	4	.481
Likelihood Ratio	4.155	4	.385
Linear-by-Linear Association	1.008	1	.315
N of Valid Cases	37		

a. 5 cells (55.6%) have expected count less than 5. The minimum expected count is .16.

**LENGTH OF PATIENT CARE
EXPERIMENT GROUP
NORMALITY TEST**

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Length_int	.156	37	.053	.937	37	.058

a. Lilliefors Significance Correction

FREQUENCY TEST

Statistics

Length_int		
N	Valid	37
	Missing	0
Mean		4.16
Median		4.00
Std. Deviation		1.236
Variance		1.529
Skewness		.141
Std. Error of Skewness		.388
Minimum		2
Maximum		7
Percentiles	25	3.00
	50	4.00
	75	5.00

**CONTROL GROUP
NORMALITY TEST**

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Length_co	.219	37	.051	.924	37	.054

a. Lilliefors Significance Correction

FREQUENCY TEST

Statistics

Length_co		
N	Valid	37
	Missing	0
Mean		4.27
Median		4.00
Std. Deviation		1.097
Variance		1.203
Skewness		.360
Std. Error of Skewness		.388
Minimum		2
Maximum		7
Percentiles	25	3.50
	50	4.00
	75	5.00

HOMOGENEITY TEST

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Length	Equal variances assumed	.660	.419	.398	72	.692	.108	.272	-.434	.650
	Equal variances not assumed			.398	70.990	.692	.108	.272	-.434	.650

COMPARISON OF THE READINESS OF HOSPITAL DISCHARGE BETWEEN TWO GROUPS BEFORE INTERVENTION

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Readiness_admitted	Control	37	9.59	1.691	.278
	Intervention	37	10.54	2.036	.335

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Readiness_admitted	Equal variances assumed	.732	.395	-2.174	72	.053	-.946	.435	-1.813	-.079
	Equal variances not assumed			-2.174	69.654	.053	-.946	.435	-1.814	-.078

COMPARISON OF THE READINESS OF HOSPITAL DISCHARGE BETWEEN TWO GROUPS AFTER INTERVENTION

Group Statistics

	Group	N	Mean	Std. Deviation	Std. Error Mean
Readiness_1	Control	37	12.81	3.143	.517
	Intervention	37	18.54	3.648	.600

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Readiness_1	Equal variances assumed	4.279	.042	-7.237	72	.000	-5.730	.792	-7.308	-4.152
	Equal variances not assumed			-7.237	70.458	.000	-5.730	.792	-7.309	-4.151

**STRESS TRANSTION
INTERVENTION
NORMALITY TEST**

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Stress_0l	.166	37	.052	.879	37	.051
Stress_1l	.282	37	.053	.802	37	.052
Stress_2l	.244	37	.054	.881	37	.053

a. Lilliefors Significance Correction

FREQUENCY TEST

Statistics

		Stress_0l	Stress_1l	Stress_2l
N	Valid	37	37	37
	Missing	0	0	0
Mean		28.59	22.84	17.49
Median		28.00	22.00	18.00
Std. Deviation		5.362	3.114	2.129
Skewness		1.446	1.543	.485
Std. Error of Skewness		.388	.388	.388
Minimum		22	20	14
Maximum		47	33	24
Percentiles	25	24.00	20.00	15.00
	50	28.00	22.00	18.00
	75	31.50	24.00	18.00

HOMOGEINITY TEST BEFORE DISCHARGE

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Stress_0	Equal variances assumed	4.038	.048	1.498	72	.138	1.568	1.046	-.518	3.653
	Equal variances not assumed			1.498	61.217	.139	1.568	1.046	-.524	3.659

RM-ANNOVA

Mauchly's Test of Sphericity^a

Measure: Stress_transition

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon ^b		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	.724	11.315	2	.003	.784	.813	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: Stress_transition

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	2283.730	2	1141.865	120.383	.000	.770
	Greenhouse-Geisser	2283.730	1.567	1457.283	120.383	.000	.770
	Huynh-Feldt	2283.730	1.626	1404.624	120.383	.000	.770
	Lower-bound	2283.730	1.000	2283.730	120.383	.000	.770
Error(Time)	Sphericity Assumed	682.937	72	9.485			
	Greenhouse-Geisser	682.937	56.416	12.105			
	Huynh-Feldt	682.937	58.531	11.668			
	Lower-bound	682.937	36.000	18.970			

CONTROL

NORMALITY TEST

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Stress_0C	.195	37	.051	.896	37	.052
Stress_1C	.179	37	.054	.945	37	.066
Stress_2C	.195	37	.051	.899	37	.053

a. Lilliefors Significance Correction

FREQUENCY TEST

Statistics

		Stress_0	Stress_1	Stress_2
N	Valid	74	74	74
	Missing	0	0	0
Mean		29.38	26.18	23.24
Median		29.00	27.00	24.50
Std. Deviation		4.538	4.531	6.285
Skewness		1.148	.313	.153
Std. Error of Skewness		.279	.279	.279
Minimum		22	20	14
Maximum		47	38	38
Percentiles	25	27.00	22.00	18.00
	50	29.00	27.00	24.50
	75	31.25	30.00	30.00

HOMOGEINITY TEST BEFORE DISCHARGE

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Burden_0	Equal variances assumed	.013	.910	3.081	72	.053	2.324	.754	.821	3.828
	Equal variances not assumed			3.081	70.799	.053	2.324	.754	.820	3.828

RM-ANNOVA

Mauchly's Test of Sphericity^a

Measure: Stress_transitionC

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon ^b		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	.559	20.354	2	.000	.694	.713	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: Stress_transitionC

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	25.099	2	12.550	3.481	.036	.088
	Greenhouse-Geisser	25.099	1.388	18.083	3.481	.054	.088
	Huynh-Feldt	25.099	1.426	17.602	3.481	.053	.088
	Lower-bound	25.099	1.000	25.099	3.481	.070	.088
Error(Time)	Sphericity Assumed	259.568	72	3.605			
	Greenhouse-Geisser	259.568	49.967	5.195			
	Huynh-Feldt	259.568	51.334	5.056			
	Lower-bound	259.568	36.000	7.210			

Tests of Between-Subjects Effects

Measure: Stress

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Intercept	153155.680	1	153155.680	6802.909	.000
Group	2407.032	1	2407.032	106.916	.000
Error	1620.955	72	22.513		

Tests of Within-Subjects Effects

Measure: Stress

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
TIME	Sphericity Assumed	1393.577	2	696.788	106.458	.000
	Greenhouse-Geisser	1393.577	1.526	913.374	106.458	.000
	Huynh-Feldt	1393.577	1.574	885.543	106.458	.000
	Lower-bound	1393.577	1.000	1393.577	106.458	.000
TIME * Group	Sphericity Assumed	915.252	2	457.626	69.918	.000
	Greenhouse-Geisser	915.252	1.526	599.872	69.918	.000
	Huynh-Feldt	915.252	1.574	581.593	69.918	.000
	Lower-bound	915.252	1.000	915.252	69.918	.000
Error(TIME)	Sphericity Assumed	942.505	144	6.545		
	Greenhouse-Geisser	942.505	109.854	8.580		
	Huynh-Feldt	942.505	113.306	8.318		
	Lower-bound	942.505	72.000	13.090		

CAREGIVER BURDEN INTERVENTION NORMALITY TEST

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Burden_0I	.178	37	.055	.883	37	.051
Burden_1I	.262	37	.056	.884	37	.051
Burden_2I	.191	37	.052	.882	37	.051

a. Lilliefors Significance Correction

FREQUENCY TEST

		Statistics		
		Burden_0I	Burden_1I	Burden_2I
N	Valid	37	37	37
	Missing	0	0	0
Mean		19.78	15.03	11.62
Median		19.00	15.00	12.00
Std. Deviation		3.449	2.061	1.460
Skewness		1.134	1.028	.482
Std. Error of Skewness		.388	.388	.388
Minimum		13	12	10
Maximum		31	21	15
Percentiles	25	18.00	14.00	10.00
	50	19.00	15.00	12.00
	75	21.00	15.50	12.50

RM-ANNOVA

Mauchly's Test of Sphericity^a

Measure: Caregiver_burdenI

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon ^b		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	.683	13.362	2	.001	.759	.786	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: Caregiver_burdenI

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	1243.748	2	621.874	131.336	.000	.785
	Greenhouse-Geisser	1243.748	1.518	819.228	131.336	.000	.785
	Huynh-Feldt	1243.748	1.571	791.658	131.336	.000	.785
	Lower-bound	1243.748	1.000	1243.748	131.336	.000	.785
Error(Time)	Sphericity Assumed	340.919	72	4.735			
	Greenhouse-Geisser	340.919	54.655	6.238			
	Huynh-Feldt	340.919	56.558	6.028			
	Lower-bound	340.919	36.000	9.470			

**CONTROL
NORMALITY TEST**

Tests of Normality

	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Burden_0C	.136	37	.082	.930	37	.523
Burden_1C	.127	37	.139	.934	37	.131
Burden_2C	.305	37	.100	.785	37	.100

a. Lilliefors Significance Correction

FREQUENCY TEST

Statistics

		Burden_0C	Burden_1C	Burden_2C
N	Valid	37	37	37
	Missing	0	0	0
Mean		22.11	22.65	21.59
Median		22.00	22.00	21.00
Std. Deviation		3.026	2.974	3.122
Skewness		.393	-.100	.915
Std. Error of Skewness		.388	.388	.388
Minimum		18	18	18
Maximum		28	28	27
Percentiles	25	20.00	20.00	20.00
	50	22.00	22.00	21.00
	75	24.00	25.00	23.00

RM-ANNOVA

Mauchly's Test of Sphericity^a

Measure: Caregiver_burdenC

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon ^b		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	.634	15.932	2	.000	.732	.756	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Tests of Within-Subjects Effects

Measure: Caregiver_burdenC

Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Time	Sphericity Assumed	20.559	2	10.279	3.383	.039	.086
	Greenhouse-Geisser	20.559	1.464	14.038	3.383	.056	.086
	Huynh-Feldt	20.559	1.511	13.605	3.383	.054	.086
	Lower-bound	20.559	1.000	20.559	3.383	.074	.086
Error(Time)	Sphericity Assumed	218.775	72	3.039			
	Greenhouse-Geisser	218.775	52.721	4.150			
	Huynh-Feldt	218.775	54.398	4.022			
	Lower-bound	218.775	36.000	6.077			

CURRICULUM VITAE

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Educational Attainment

Degree	Name of Institution	Year of Graduation
Bachelor in Nursing	Faculty of Nuring Universitas Padjadjaran, Indonesia	2008
Master of Nursing	Faculty of Nursing Universitas Indonesia, Indonesia	2020

Scholarship Award during Enrolment

1. Prince of Songkla Extension Centre Grant, Prince of Songkla University, Hat Yai, Thailand (2020)
2. Research Grant Fiscal from Graduate School, Prince of Songkla University, Hat Yai, Thailand (2023)

List of Publications

Ganefianty, A., Songwathana, P., & Nilmanat, K. (2021). Transitional care programs to improve outcomes in patients with traumatic brain injury and their caregivers: A systematic review and meta-analysis. *Belitung Nursing Journal*. <https://doi.org/10.33546/bnj.1592>.

Ganefianty, A., Songwathana, P., & Damkliang, J. (2023). Feasibility study of m-health transition care program for traumatic brain injury caregivers. *International Journal for Innovation Education and Research*. <https://doi.org/10.31686/ijier.vol11.iss10.4179>.

Ganefianty, A., Songwathana, P., & Damkliang, J. (2023). Intermediate care for Traumatic Brain Injury Patients and Caregivers in Low-Middle Income Countries: A Narrative Review. *European Journal of Medical and Health Sciences Journal*.

Under Process

1. Effectiveness of m-Health Supportive Care Transition Program in Improving Post Discharged Outcomes Among Traumatic Brain Injury Caregivers: A Randomized Controlled Trial
2. Readiness for hospital discharge perceived by caregivers of patients with moderate or severe traumatic brain injury: A cross-sectional study

Conference Attended

1. Oral Presenter at First Ph.D. Nursing Annual Conference 2021, Faculty of Nursing (FON), Prince of Songkla University (PSU), Hat Yai, Thailand: "Leading Together: Advancing Nursing Care Through Research and Innovation" (December 2021)
2. Oral presentation at "PSU International Conference Enhancing continuity of care through the science and art in nursing and midwifery" (October 2022)
3. Oral presentation at the 1st International Conference in Palliative Care and Family Health Nursing, 2023, Thammasat University Rangsit Campus, Thailand (June 2023)
4. Oral presentation at the 15th Annual Conference "Shaping the future of nursing research and education for the Sustainable Development Goals" (July 2023)
5. Oral presentation at the 1st FON Graduate Studies Annual Conference and the 2nd Ph.D. Nursing Annual Conference (October 2023)