

## The Development of Nursing Care Model for Severe Multiple Injuries in Krabi Hospital

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### Abstract

This research and development study aimed to develop nursing care model for severe multiple injuries in Krabi Hospital. The sample consisted of 85 registered nurses using the nursing care model and 632 patients with severe multiple injuries who were admitted to Krabi Hospital between June 1<sup>st</sup> 2017 and September 30<sup>th</sup> 2018. The tools used in the research implementation were: a medical records review form, a questionnaire on opinions towards using the nursing care model and practices and nurse's satisfaction, a scorecard indicator for monitoring each patient's quality of care. Data were analyzed using mean, percentage, standard deviation Independent t -Test and content analysis. The results of this study revealed as follows:

1. The situational analysis showed no nursing care model for patient with severe multiple injuries. The practice was based on the knowledge and experience of nurses.
2. The nursing care model for patient with severe multiple injuries consisted of three phases: pre-hospital phase, in-hospital phase, and definite care and continuing care after discharge.
3. The outcomes of implementing the nursing care model were that, In emergency department, percentage of many indicators changed as follows: Percentage of level 1 (life threatening) trauma patients staying in ER less than 2 hrs. increased from 76.51% to 97.06%, patients receiving blood transfusion within 30 minutes increased from 69.56% to 88.75%, percentage of penetrating abdominal trauma patient in shock receiving surgery within 30 minutes increased from 77.26% to 81.47%, necessary emergency craniotomy/craniectomy increased from 90.11% to 100%, reducing mortality of patients with PS score > 0.75 from 9.52% to 4.04% and the registered nurse's satisfaction towards using the nursing care model increased from 78.36% to 85.68.

All findings of this study suggest that the nursing care model for patients with severe multiple injuries can be used for the safety of patients and the prevention of serious complications.

**Keywords:** Development; Nursing Care Model for Severe Multiple Injuries; Krabi Hospital

### Preface

Accident is one of the pressing healthcare issues of Thailand and is ranked third for its mortality rate after cancer and heart disease. In 2000, there were more than 5 million deaths from accidental injuries worldwide. The tendency of its increase especially in low- or middle-income countries can clearly be seen. It was predicted that in 2020, the number of deaths from accidental injuries would increase by 80% or one-tenth of the total population [1]. In Thailand each year, there were around 40,000 deaths from accidental and other injuries of which 14,000 cases, or one-third, were road accidents [2], putting Thailand at the 6<sup>th</sup> of the world. From the study of Asst. Prof. Komet Thongkhao [3] on the duration between the occurrence of injury and death. It was found that death of injured people could be categorized in 3 stages: the 1<sup>st</sup> stage is death on-scene or less than 60 minutes after injury occurrence due to severe injuries such as severe head injury, respiratory failure and massive blood loss which could cause 50% death at this stage. The 2<sup>nd</sup> stage is death between 1 and 4 hours after the accident. It was found that 30% of the injured died in ER or OR. And the 3<sup>rd</sup> stage is death at about 1 week after the injury. 20% of the injured died at this stage due to sepsis and multiple organs dysfunction syndrome.

Nursing care of patients with severe injuries can be done in many ways to ensure lifesaving and systematic improvement. If patients receive proper nursing care right at the injury site, not only will there be prompt relieving of symptoms and lower risk of complications from delay in treatment but also reduction of national cost. In Germany, costs of all accidents were around 25% of annual national budget or 200 billion Baht [4].

Nursing care of accident patients needs collaboration of multidisciplinary team and other non-public health organizations with the aim to reduce as much as possible the number of casualties, severity of injuries, and the death and disabilities of the injured, starting right at the injury site. Taking care of patients with severe injuries requires knowledge, understanding of principles and procedures for patient assessment and lifesaving. With accurate knowledge, nurses can evaluate patient's conditions and predict future problems or critical conditions, resulting in a timely management of care.

From the statistics of 48,547 patients admitted to Krabi Hospital's ER, 12,180 were accident patients of which 4,164 were from road accidents, 600 were with severe multiple injuries and 81 patients died in the mentioned stages after the accidents. (11 passed away before reaching the hospital, whereas 70 died while being treated in the hospital [5]). When considering the cause of their death, it was found that they received different assessment and care since their injury. This depended on the skills and experience of each nurse in evaluating and predicting problems or critical conditions that might occur, resulting in possible delayed management and care and severe complications [6]. Therefore, the continuity of a nursing care model to be used from on-scene to in-hospital (from admission to discharge) through to after discharge will not only balance the quality and cost of care but also balance the demand of the patients and the satisfaction of both care providers and the ones responsible for the costs. This is in accordance with the study of Puangrat Boonyanurak which stated that the development of a quality nursing care model must properly and suitably answer health needs of people. It must focus on promoting good health, providing nursing care services, preventing severe illness, providing nursing care in recovery period for quick recuperation and preventing possible complications. All these can be possible by collaboration of healthcare executives and practitioners in developing nursing care model that reflects the strong intention to create quality and safety in every step of nursing care, especially for patients with severe multiple injuries who are in critical conditions. Nursing activities need to be accurate, standardized and coherent throughout the organization. The researcher is therefore interested in studying and developing a nursing care model for severe multiple injuries to set up a coherent nursing practice guideline that would allow accurate, fast and safe nursing care for patients with injuries.

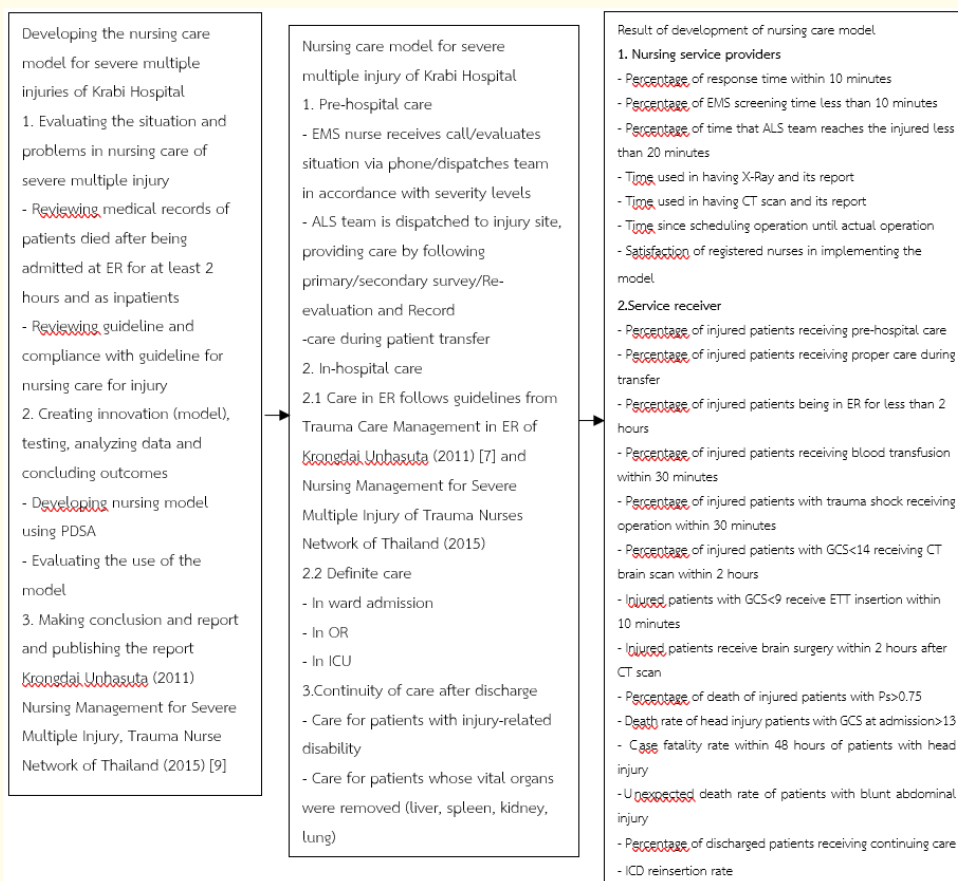
### Objectives of the Study

1. To study nursing situation for severe multiple injuries of Krabi Hospital.

2. To improve nursing services for severe multiple injuries of Krabi Hospital.
3. To study the result of implementation of the development of nursing care model for severe multiple injuries of Krabi Hospital.

### Conceptual Framework

This study is aimed at developing nursing care model for severe multiple injury of Krabi Hospital by following the 7 steps of research and development framework: evaluating situation and problems, developing innovation, testing, analyzing data, concluding the outcomes, writing a report and publishing the report. The conceptual framework was as follows.



Figure

### Research Methodology

This research and development were divided into 3 phases 1) situational analysis 2) development of nursing care model 3) evaluation of outcomes of the development. The research methodology was as follows.

**Phase 1: Situational analysis:** The analysis of situation of nursing care for severe multiple injuries of Krabi Hospital was performed as follows:

1. The researcher gathered 70 medical records of patients with severe multiple injuries who died during their admission to Krabi Hospital.
2. The team for the development of nursing care model for severe multiple injuries worked together in reviewing those medical records. They looked for problems and obstacles in nursing care procedures and used that information in preparing the team and planning the development of nursing care right from the call takings in EMS, on-scene nursing activities in 3 phases (primary survey, secondary survey and re-evaluation before transferring to hospital), nursing care from admission to discharge, continuity of care after discharge as well as patient referral to other more equipped hospital. The planning included setting the indicators for monitoring quality of care in accordance with field note form (IS) of National Institute for Emergency Medicine [10], Handbook of Quality Indicators for Trauma Center of Thailand [11] and Handbook for Indicator of Thailand Hospital Indicator Program (THIP II) of the Healthcare Accreditation Institute [12].
3. The researcher studied textbooks, academic journals and research materials relating to nursing care of severe multiple injuries for the planning and designing of the model for nursing care which would cover call taking of EMS, on-scene care, care in ER, OR and ICU, care from admission to discharge of inpatients, continuity of care after discharge. The model of the nursing care can be divided into 3 phases: Pre-hospital, In-hospital and Definite care, and continuity of care after discharge.
4. The researcher presented the development of this model to Krabi Hospital's Director for project approval and appointment of its Development Committee.

**Phase 2: Development process of nursing care model for severe multiple injuries:** The procedures of the development are as follows:

1. Brain-storm meetings were organized to set up the model under the 7 steps of research and development framework: evaluating situation and problems, creating innovation, testing, analyzing data, concluding the outcome, writing a report and publishing the report. The details of how the nursing care model was developed are as follows:
  - a. Developing this nursing care model using research procedures and the conceptual framework of Australian National Health and Medical Research Council's Guide to the Development, Implementation and Evaluation of Clinical Practice Guidelines [13] which focused on 9 principles (1) change the outcomes (2) be based on best available evidence (3) strongest applicable method should be used to synthesize the evidence (4) involve multidisciplinary team and guideline users (5) guideline should be flexible and adaptable to the condition of each organization (6) bear in mind the resource constraints (7) guideline practitioners should be taken into account in every step of the development (8) check accuracy and benefits of the guideline (9) revise and improve the guideline regularly. The development process is aimed at finding nursing intervention that will lead to expected changed outcomes which are the healthcare of patients rather than the nursing process.
  - b. Holding meetings explaining the nursing care model for severe multiple injuries to related practitioners.
  - c. Holding academic meetings to give practitioners more knowledge concerning care for severe multiple injuries.
  - d. Improving human resource potential in screening, evaluating conditions and providing care for injury patients from admission, discharge and care after discharge.

- e. Providing care for the injured in line with the developed nursing care model in this experimental phase. The researcher team were responsible for consultation, monitoring implementation, collecting and analyzing of data monthly, solving problems and improving the nursing procedures in the nursing care model.
  - f. Preparing Trauma Audit with multidisciplinary team and constantly improving quality of care. Data must be more systematically collected by using some of the indicators for Trauma Center of Thailand [11] in collecting data of quality of care for severe multiple injuries as well as field notes (IS) of National Institute for Emergency Medicine and Handbook of THIP II of Healthcare Accreditation Institute [12]. These had made the indicators reflective to the quality of care for severe multiple injuries of Krabi Hospital.
  - g. Setting up Trauma Fast Track such as CT fast track, how patients who need operation can be admitted into OR within 30 minutes, or lab result within 20 minutes.
  - h. Setting up nursing care model for severe multiple injuries for Krabi's healthcare network with collaboration of rescue teams, subdistrict administrative organizations, community hospitals, EMS and Krabi Hospital as well as other more equipped hospitals for patient referrals.
2. Putting the nursing care model into trial and improving it by using 3-Cycle PDCA. Any problems or obstacles discussed in the development team were solved and improved such as assigning the jobs for EMS staff and setting registered nurse as head of team, dispatching team within 10 minutes after call taking, evaluating and providing care with ATLS in all 3 phases of care, cooperation and fast tract being in place from on-scene, admission to ER, lab test, X-Ray, patients being admitted to OR within 30 minutes, continuity of care in ICU and IPD. All these resulted in how patients reached care services faster with less disability and death risks. Triss Score is now used in the admission to ER to evaluate severity of injuries.
  3. The outcomes of the trials were adjusted to suit the nursing care model for severe multiple injuries of Krabi Hospital. It consisted of 3 care phases: Pre-hospital care, In-hospital care and Definite care.

**Phase 3:** Evaluation of outcomes of the development of nursing care model for severe multiple injuries was performed as follows:

1. Collecting indicator data qualitatively and quantitatively by following the model developed in the trail and evaluation phases.
2. Evaluating the implementation of this nursing care model by using questionnaires on 85 registered nurses with more than 3 years of experience in either EMS, ER, OR, ICU, surgical wards, orthopedic ward of Krabi Hospital.
3. Evaluating the nurses' satisfaction in the nursing care model for severe multiple injuries.
4. Evaluating the satisfaction of patients with severe multiple injuries towards the nursing services received during the trial and evaluation phases.
5. Collecting quality indicator data to evaluate the outcomes of care and nursing for continuity of care, creating 3-cycle PDCA.

### Population and samples

Population in this research can be divided into 2 groups:

1. 106 registered nurses with experience in services relating to care of severe multiple injuries as EMS, ER, OR, ICU, surgical wards and orthopedic ward.
2. 632 patients with severe multiple injuries admitted to Krabi Hospital between June 1<sup>st</sup> 2017 - August 31<sup>st</sup> 2018.

Specific samples from the research population are divided into 2 groups as follows:

1. 85 registered nurses with more than 3 years of experience in related units as EMS, ER, OR, ICU, surgical wards, orthopedic ward of Krabi Hospital.
2. 632 patients with severe multiple injuries from the above-mentioned research population were separated into two groups. 360 were in the trial phase of 3-cycle PDCA while 272 were in the outcome evaluation phase.

### The research instruments

The tools used in the research implementation were: a medical records review form, a questionnaire on opinions towards using the nursing care model and practices and nurse's satisfaction, a scorecard indicator for monitoring each patient's quality of care.

### Tool quality inspiration

The Researcher bring the tools for 3 expert persons check the quality, content validity, possibility of implementation. After improved the tools, try out the tool with and 30 patients with severe multiple injuries, Reliability of the tools was tested using Cronbach's alpha coefficient yielding values of .89 respectively.

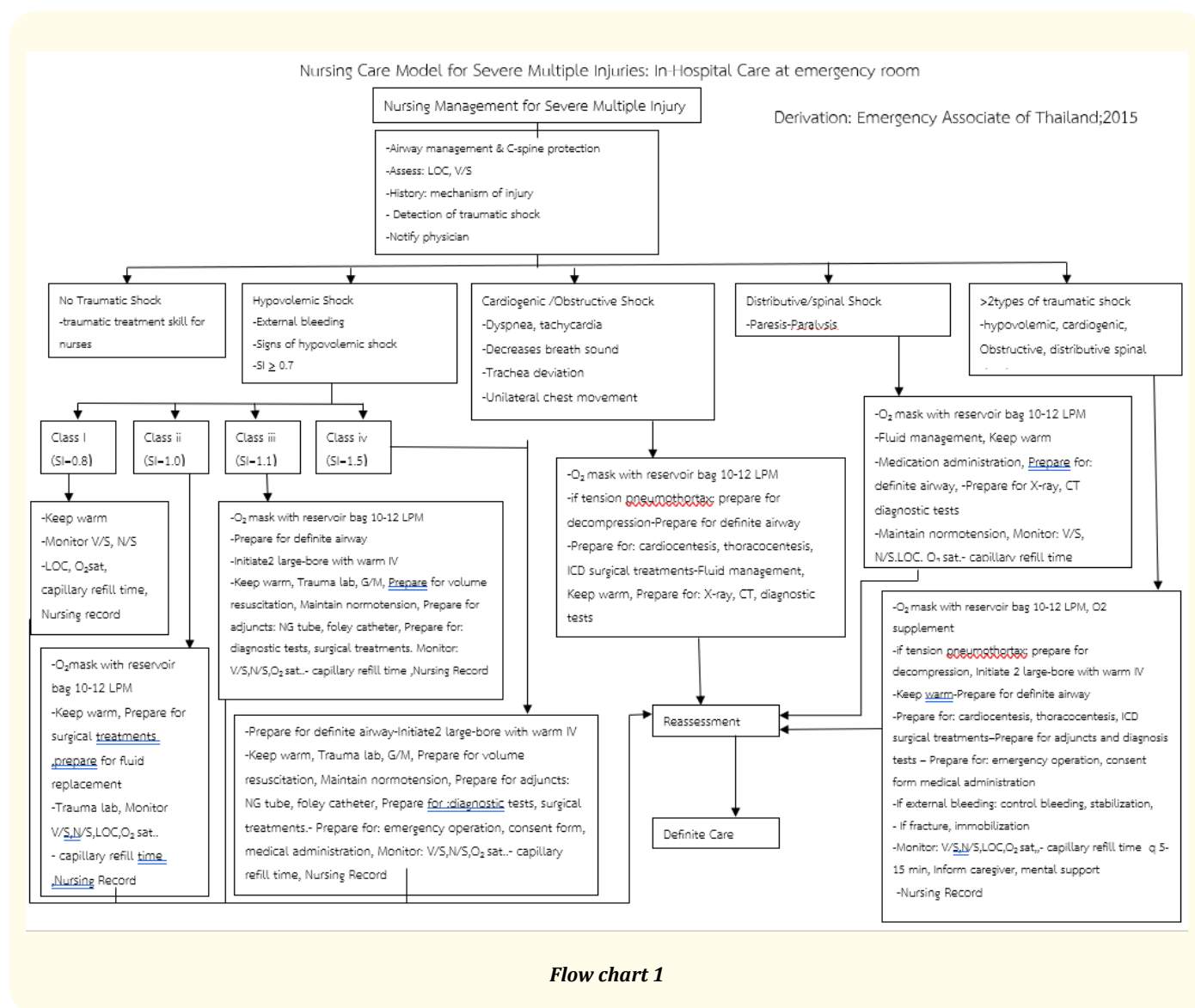
### Data analysis

Data were analyzed using mean, percentage, standard deviation Independent t-test and content analysis.

### Research outcomes

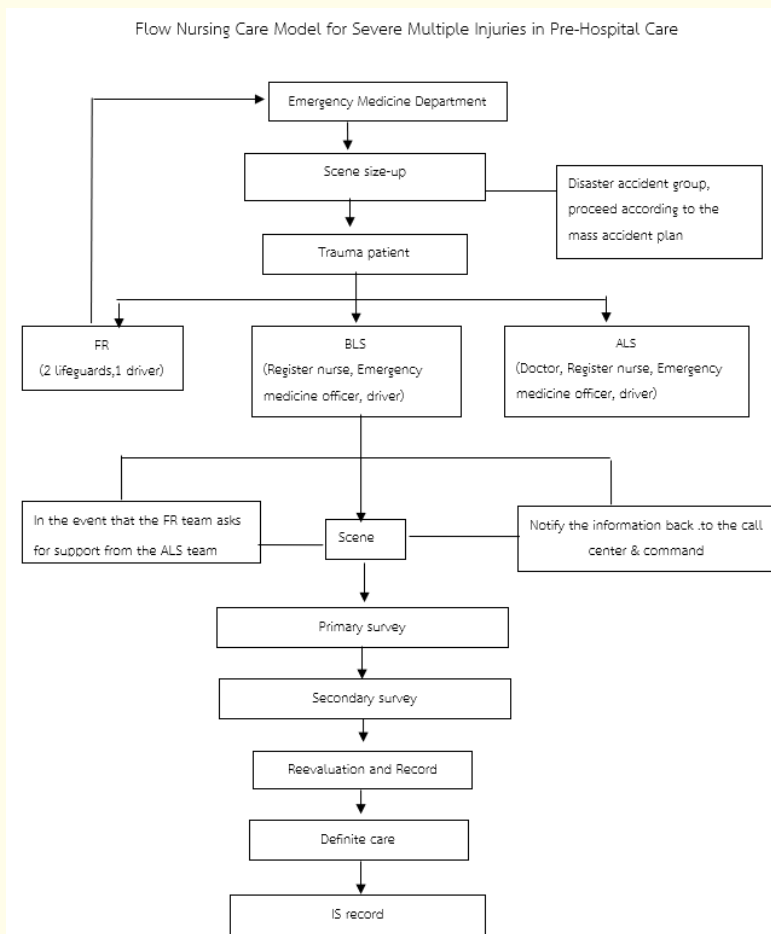
1. Situational analysis: Problems and obstacles from the nursing care for severe multiple injuries were found in how activities of the team were not complete, ER team had not fulfilled their role or assigned duties, inefficient communications, no nursing care model for severe multiple injuries of Krabi Hospital in writing and nursing practices depended on knowledge and experience of each practitioner.
2. Development: There were 3 phases of nursing care for severe multiple injuries as follows:
  - a. Pre-Hospital Care.
    - i. Nurses at EMS perform history taking of the injured and dispatch ALS team to the injury site.
    - ii. ALS team evaluates the conditions of the injured and performs primary survey, secondary survey and re-evaluation and record before transferring the injured to the hospital.
    - iii. Contact the EMS of Krabi Hospital for continuing care and perform nursing care during the transfer.

b. The model for severe multiple injuries care in ER as shown in flowchart 1.



c. The model for definite care as shown in flowchart 2.

3. Evaluation Outcomes of the development of nursing care model are as shown in table 1.



Flow chart 2

Indicators	Before having the model (N = 270)	After having the model (N = 272)
Percentage of response time within 10 mins	82.44	90.53
Percentage of EMS screening time < 10 mins	94.89	98.88
Percentage of patients whose duration between injury time and scene arrival time of ALS team <20 mins	85.95	89.64
Percentage of ER patients having pre-hospital care	77.06	82.93
Percentage of proper and standard nursing care during transfer	71.21	76.33
Percentage of level 1 trauma patients staying in ER <2 hrs.	76.51	97.06
Percentage of patients with type-specific blood receiving transfusion within 30 mins after request	69.56	88.75
Percentage of penetrating abdominal trauma patients in shock receiving operation in 30 mins	77.26	81.47
Percentage of patients with GCS <14 receiving CT brain scan in 2 hrs.	86.78	97.59



Percentage of patients with GCS <9 receiving ETT in 10 mins	78.77	97.30
Duration between CT and receiving result (mins)	65	47
Duration between X-Ray and receiving result (mins)	110	79
Duration between sending lab test and receiving results (mins)	66	40
Duration between arrival at hospital to arrival at OR (hour)	5.15	2.06
Duration between diagnosis, OR scheduling and OR admission (mins)	23.15	15.12
Percentage of patients needing emergency craniotomy/craniectomy receiving operation within 2 hrs. after CT scan	90.11	100
Percentage of death of patients with Ps >0.75	9.52	4.04
Fatality rate of head injury patients with GCS at admission >13 points	7.93	1.47
Case fatality rate within 48 hrs. of head injury patients	3.43	1.80
Unexpected death rate of blunt abdominal injury	2.5	0
Rate of unplanned admission to ICU of blunt abdominal injury patients	2.5	0
Fatality rate of multiple injury patients with PS score > 0.75	1.53	0.72
Rate of injury patients receiving consultation from psychiatric nurse	85.71	100
Satisfaction rate towards pain relief	90.4	92.0
ICD reinsertion rate	10.00	2.22
Percentage of blunt abdominal injury patients receiving services in accordance with the model	72.72	92.86
Percentage of patients receiving continuity of care after discharge	26.78	38.93
Registered nurses' satisfaction towards implementation of the model	78.36	85.68

**Table 1:** Comparing quality indicators of nursing care for severe multiple injuries before and after the development of nursing care model for severe multiple injuries of Krabi Hospital.

From table 1, after the development of the nursing care model, in pre-hospital phase, there was an increase in percentage of patients admitted to ER with pre-hospital care from 77.06% to 82.93%. The percentage of times that ALS team reached injury site within 10 minutes increased from 82.4% to 90.5%. EMS screen time <10 mins increased from 94.89% to 98.88%. There were more standardized and proper care of the injured during transfer from 71.21% to 76.33%. For the in-hospital care, percentage of level 1 trauma patients staying in the ER for less than 2 hours rose from 76.51% to 97.06%. Percentage of patients who received blood transfusion 30 minutes after request rose from 69.56% to 88.75%. From 77.26% to 81.47% of patients with penetrating abdominal trauma with shock received operation within 30 minutes. Percentage of patients with GCS < 14 receiving CT brain scan within 2 hours increased from 86.78% to 97.59%. Patients with GCS < 9 receiving ETT insertion within 10 minutes rose from 78.77% to 97.30%. Duration between having CT scan and receiving its report reduced from 65 minutes to 47 minutes while for X-Ray from 110 minutes to 79 minutes. Duration between sending lab test and receiving results reduced from 66 minutes to 40 minutes. The total time between patient's arrival to hospital and admission to OR reduced from 5.15 hours to 2.06 hours. Before the model was developed it took 23.15 minutes between doctor's diagnosis and OR admission, it now takes only approximately 15.12 minutes. Percentage of patients with indications for emergency craniotomy/craniectomy received surgery within 2 hours after CT scan increased from 90.11% to 100%. Percentage of death of patients with Ps > 0.75 lowered from 9.52% to 4.04%. Percentage of death of patients with GCS 13 - 15 points reduced from 7.93% to 1.47%. Percentage of patients received continuity of care after discharge rose from 26.78% to 38.93%. And finally, percentage of registered nurses' satisfaction towards the implementation of this guideline increased from 78.36% to 85.68%.

### Discussion and Conclusion

The Development of Nursing Care Model for Severe Multiple Injuries in Krabi Hospital. Developed as camphor. The 4 dimensions of the service system are integrated: medical treatment, health promotion, illness prevention, and rehabilitation to be consistent with the new direction of health services. Demonstrate that to develop an effective nursing model, administrators and practitioners must jointly

create a service system based on a professional approach that recognizes the values, needs and privileges of the person who relates and expresses their relationship. Behavior that conveys caring care and a desire to establish quality and safety in all care processes, especially those with severe systemic trauma, a critical life threat to a caregiver. There is a cooperation between executives and practitioners to make the patient as safe, which is in line with the study of Rangsan Chaikit Amnuaychos, Sompeng Khoschaloemwong and Sasithorn Prangthong. Time after using the fast track for the average time spent in the emergency room, blood collection, X-ray room, and operating room preparation, the time spent moving patients from the emergency room to the operating room after using the expressway system, were found in the severely injured patients. It was explained that the development of the fast track system for severely injured patients was one way to enable rapid patient care and a systematic co-ordination of care across the team, resulting in the patient. Receive standard on-site care, lower waiting time for laboratory test results, faster surgery, resulting in reduced mortality.

The results of the development of a nursing care model for severe multiple injuries in Krabi Hospital found that the time from patient to officer to patient < 20 minutes. Increased standardized care during delivery, reduced red screened time in the emergency room, decreased hospital arrival time to operating room Down explained that the development of a more efficient multi-system nursing care model was improved in all aspects.

### Research Suggestions

1. Apply the research results for academic purposes. Teaching and learning to develop the competency of personnel in the care of severe multiple injuries in many systems to be safe, reduced severe complications.
2. Develop a system to monitor and visit the injured after discharge to be safe, reduce complications that can be prevented.
3. Follow up, supervise, and analyze performance results to improve the quality of care to ensure the safety of patients continuously and sustainably.

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