

# Structure and Process of Palliative Care Provision: A Nationwide Study of Public Hospitals in Thailand

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## Research Article

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# Abstract

**Background:** The demand for palliative care in hospitals has rapidly increased in Thailand in recent years. Subsequently, the way in which palliative care systems should be arranged to facilitate the care process and patient preparation for their end stage of life (i.e., good death) is still an ongoing debate among policy makers and researchers. Although palliative care is provided in most facilities, there is no clear protocol for palliative care due to a lack of empirical evidence. Thus, this study attempts to analyse the situation and quality of palliative care provision in Thai public hospitals.

**Methods:** A cross-sectional study was conducted in 2018. A questionnaire with measures reflecting hospital characteristics, structure of palliative care provision, and processes related to achieving a good death was developed. The questionnaire was sent to all 862 public hospitals across 76 provinces, and the response rate was 62.88%. A structural equation model was specified to operationalize Donabedian's framework. To our knowledge, this is the first nationwide study to investigate facility-level palliative care provision in Thailand.

**Results:** The study results confirmed the relationships between the structure and process of palliative care provision in hospitals. The sufficiency and competency of doctors and nurses and the variety of relaxation equipment were either directly or indirectly associated with all process components associated with response to the patient's needs, effective communication, and respect to the patient's dignity. In addition, the conduction of palliative care research in hospitals was associated with the response to the patient's needs and effective communication, while the allocation of physical area was associated with effective communication.

**Conclusion:** This model can be used to evaluate the overall situation of palliative care provision at the national level. It could also contribute to the development of standard measurements for evidence-based palliative care quality improvement in hospitals.

## Introduction

An increasing demand for facility-based palliative care in Thailand has gained attention from healthcare professionals, scholars, and policy makers [1]. It has been reported that the number of patients who needed palliative care in public hospitals increased almost five times from 13,399 in 2014 to 64,182 in 2019 [2]. This highlights the need to advance the country's palliative care provision to ensure quality of care as well as the quality of life of the patients.

The development of palliative care in Thailand is classified into the preliminary stage of integration into mainstream health care services, at which time palliative care reached a critical mass of provision in most locations with regular support in terms of drugs, capacity and policy implementation [3]. However, many challenges regarding the structure of palliative care at the facility level have been reported. The challenges are, for example, inadequate palliative care training for medical and nursing staff, lack of intrafacility coordination among specialists, high workload for hospital staff, unavailability of drugs in

smaller facilities, lack of medical equipment, limited number of studies that could be used to promote quality of care and quality of life of patients, and lack of protocols for nonmedical practices such as communication with patients and psychosocial-spiritual support [1, 4-8].

The way in which palliative care systems should be arranged to facilitate the care process and patient preparation for their end stage of life (i.e., good death) is still an ongoing debate. There have been continuing efforts to develop a protocol for palliative care provision in Thailand's context. In fact, many guidelines and quality of care measuring tools are available for wider use [9-11]; nevertheless, most Thai hospitals report following the guidelines developed in each facility [12]. In addition to the nationwide implementation of palliative care performance indicators related to some care process (e.g., opioid drug provision; advance care planning; home visit) [13-14], there is no clear protocol for the provision of facility-based palliative care in the country [12]. To date, assessments of the situation and quality of palliative care provision across medical facilities are still limited.

Herein, we use facility-level data that can commonly be obtained from public hospitals that offer palliative care to investigate how hospitals have arranged palliative care provision systems and whether the arrangements could be linked to palliative care processes that enhance patient quality of life. This nationwide study, hence, is the first step in exploring the current situation of facility-based palliative care provision in Thailand. The evidence from this study offers another meaningful insight for the development of common quality measurement tools and eventually the improvement of palliative care quality in Thailand.

## Framework

The Donabedian quality of care framework has been widely used to confirm the linkages between the structure and process of palliative care in prior work [15-20]. Conceptually, quality of care measures comprise three categories: structure, process and outcome. Structure refers to organizational features or characteristics that are presumed to have an impact on the performance of health care organizations [21]. Structural challenges might be the cause of problems identified in the process of care. The palliative care process emphasizes the actions of healthcare providers and the interactions healthcare providers have with patients and family members. The presence of clear practice guidelines as well as the availability and quality of human and material resources could determine how well patients' physical, psychosocial and spiritual needs are responded to and respected [22-25]. A good process of care reflects good preparation for patients' end stage of life, which eventually leads to good palliative care outcomes and ultimately good death [26-27].

## Methods

### Participants and Procedures

We approached hospital directors from all 862 public hospitals operating under the Ministry of Public Health across 76 provinces in Thailand. After obtaining informed consent, the director of each hospital assigned one medical staff member working in palliative care as a representative to provide information about palliative care in his/her respective facility. The respondents were given the option of completing the questionnaire online, with a hard copy, or by telephone interview. Where possible, a reminder was sent to respondents 2 to 4 weeks after they received the questionnaire. This study was approved by the Ethics Committee, Mahidol University Institutional Review Board and the participating hospitals that required the study to be approved by their own ethics committee.

A total of 542 hospitals returned completed questionnaires, yielding a response rate of 62.88%. The respondents were registered nurses (55.0%), head nurses (43.7%) and hospital directors (1.3%). Most of them were female (97.6%). The average age was 44.4 years (SD=8.21). The average number of years of work experience in palliative care was 4.04 (SD=3.09). Regarding classification by service capacity and size, the participating hospitals included 17 (3.1%) advanced-level tertiary care hospitals (400 – 1,000 beds), which served as referral centres at the regional level; 63 (11.7%) standard-level and middle-level tertiary care hospitals (150-500 beds), which served as referral centres at the provincial level; and 462 (85.2%) first-level and middle-level secondary care hospitals (10-120 beds), which provided care at the district level. The distribution of participating hospitals was quite similar to that at the country level and that across each region in the country.

## Measures

***Hospital characteristics.*** Data on the hospital *type* (level of service capacity) and *size* (number of beds) were collected and analysed to explain the characteristics of participating hospitals.

***Structure of palliative care.*** Structure in this study is defined as the hospital context in which palliative care is provided. This includes human resources and management, medical and nonmedical equipment, research activities and physical space.

Human resources include latent and manifested variables. *The sufficiency of medical personnel* is a latent variable comprising two observed indicators: the ratio of palliative care doctors to palliative care patients and the ratio of palliative care nurses to palliative care patients. *Staff competency* is represented by two manifested variables: the number of doctors and the number of nurses who had attended at least one month of palliative care training. *The availability of a multidisciplinary team* is measured by the number of medical and nonmedical specialist types in the hospital's assigned palliative care team. The availability of nonmedical staff who generally play important roles in palliative psychosocial care is represented by two manifested variables: the *number of social workers* and the *number of psychologists in the hospital*.

The availability of medical and nonmedical equipment variables reflects the hospitals' capacity to provide palliative care. We measured the *variety of medical equipment* and *variety of relaxation equipment* by counting the types of medical equipment necessary for palliative care that are available for

use for palliative care patients, such as syringe drivers, infusion pumps, airbeds, and oxygen concentrators, as well as relaxation equipment or physical space, such as media players, magazines, novels and religious practice rooms. *The availability of medicine* is measured by the number of types of pain control drugs. *Research in palliative care* and *the presence of designated areas for palliative patients* were measured dichotomously to indicate whether the hospital has performed any research related to palliative care and whether there is a space offered specifically to palliative care inpatients.

***Process concerning good death.*** The structural components of palliative care are hypothesized to affect hospitals' practices, which would eventually lead to a good dying process. *Time spent by doctors* and *time spent by nurses* refers to the average amount of time (in minutes) palliative care doctors and nurses spent in active conversation with each palliative care patient.

The process of preparing patients and/or their family caregivers for the end stage of life is classified into three concepts: response to physical and psychological needs, effective communication, and respect to patients' needs/dignity. The latent variable *response to physical and psychological needs* has five indicators measured by the percentage of palliative care cases receiving care according to guidelines for different aspects of care, which are pain management, delirium management, depression management, spiritual care management and bereavement care management. *Effective communication* has four indicators measured by the percentage of patients who received bad news from trained medical staff, who received bad news in compliance with related guidelines, who received advice from trained advance care planning staff, and who received advice related to advance care planning guidelines. *Respect to patient* has two indicators: percentage of patients or patient's family who participated in decision-making about medical treatment and the facilitation of making a written living will.

## **Statistical Analysis**

To model for simultaneous relationships among multiple latent constructs and manifesting variables, we employed a structural equation modelling (SEM) approach. Confirmatory factor analysis (CFA) was performed to examine the validity of the measurement for each construct. Model fit assessment was conducted after performing model specification to evaluate how well a specified model fits the data. The threshold of acceptable goodness of fit includes a comparative fit index (CFI)  $>.95$ , standardized root mean square residual (SRMR)  $< 0.08$  and root mean square error of approximation (RMSEA)  $< 0.08$  [28].

## **Results**

### ***Characteristics of the Study Sample***

Of the 542 hospitals, the average number of hospital beds was 103.15 (SD=147.12). In terms of the sufficiency of medical personnel, the average doctor-to-palliative patient and nurse-to-palliative patient ratios were 0.38 (SD=0.42) and 1.61 (SD=2.11), respectively. Only 56 hospitals (10.3%) reported having doctors, and 274 hospitals (50.6%) reported having nurses who attended at least one month of palliative care training. Hospitals with higher capacity appeared to have a larger number of palliative-care-trained

medical staff. Most hospitals reported that they had a multidisciplinary team for palliative care, comprising an average of 5.13 (SD=1.55) types of medical and nonmedical professionals (e.g., physicians, registered and practitioner nurses, nurse aids, pharmacists, social workers, psychologists, physical therapists, nutritionists, music therapists, Thai traditional massagers). Sixty-three (11.6%) and 182 (33.6%) hospitals reported having at least one social worker and at least one psychologist, respectively.

Pain medications that are generally used for palliative care patients, such as tramadol and morphine injections, were available in most hospitals (98.0% and 96.5%, respectively). Hospitals with higher capacity had a greater variety of pain medication. In terms of medical equipment, most hospitals had air mattresses, oxygen concentrators and infusion pumps (78.2%, 68.1% and 63.8%, respectively), while 44.5% had syringe drivers. There was a variety of relaxation equipment available for palliative care patients. Apart from general media such as video, radio, TVs and reading materials, most hospitals had Dhamma books and cassettes (89.5% and 72.7%, respectively), while some had Christian tabernacles (22.7%) and/or Islamic prayer rooms (11.1%). The average number of relaxation equipment types was 3.24 (SD=1.70).

Most hospitals (64.6%) did not have designated areas specifically for palliative care patients. Only 3 hospitals (0.6%) had a ward allocated for palliative care, 28 hospitals (5.2%) had a palliative care zone, and 161 hospitals (29.7%) had beds dedicated to palliative care patients. Only 114 hospitals (21.03%) reported that they had conducted research in palliative care. Regarding the process of care, the average time spent by medical staff per patient was 22.19 minutes (SD=13.0) for doctors and 40.14 minutes (SD=15.30) for nurses. Table 1 presents the descriptive statistics of the participating hospitals.

### ***Reliability and Validity of Latent Variables***

Table 2 presents the results from the reliability and validity analyses of palliative care process latent variables. The Cronbach's  $\alpha$  values for the variables *response to physical and psychological needs* and *effective communication* were found to exceed 0.7 (Cronbach's  $\alpha$  = 0.88 and 0.83, respectively), indicating good internal consistency [29-30]. However, the variable *respect to patient* demonstrated a lower internal consistency (Cronbach's  $\alpha$  = 0.45), and the elimination of the indicator *living will* resulted in an acceptable internal consistency of the variable (Cronbach's  $\alpha$  0.71). The results from the confirmatory factor analyses revealed acceptable fit indices for all three latent variables, indicating the validity of the constructs.

### ***Structural Equation Modelling***

Structural equation modelling (SEM) was conducted to simultaneously examine the relationship between a hospital's palliative care structure and the process of care concerning a good death, as hypothesized in the Donabedian's framework [31]. Hospital structure variables including *sufficiency of medical staff* [Sufficiency], *number of beds* [HosBed], *staff competency* [IntensiveDR, IntensiveRN], *availability of multidisciplinary team* [varietyMulti], *number of social workers* [StfPaISW], *number of psychologists*

[StfPalPSY], *variety of medical equipment* [varietyMediEqu], *variety of relaxation equipment* [varietyRelaxEqu], *availability of medicine* [varietyMed], *research in palliative care* [ResearchPal], and *presence of designated area for palliative patients* [PallArea], were hypothesized to have a direct influence on the process of care, which are *response to physical and psychological needs* [PhysPsycho], *effective communication* [Communication], and *respect to patient* [Respect] and an indirect influence through *time spent by doctors and nurses*. The model fit statistics for the hypothesized model were poor ( $\chi^2/df = 10.784$  ( $p = 0.000$ ), GFI = 0.696, AGFI = 0.573, CFI = 0.545, RMSEA = 0.134, and SRMR = 0.165). The hypothesized SEM model is presented in Figure 1.

After model revision, with insignificant paths removed and measurement errors allowed to be correlated, Figure 2 shows the revised structural model with only significant associations among the variables. It was found that *variety of relaxation equipment* [varietyRelaxEqu] ( $\gamma = 0.23$ ,  $p < 0.001$ ) and *research in palliative care* [ResearchPal] ( $\gamma = 0.21$ ,  $p < 0.001$ ) had significantly positive associations with *response to physical and psychological needs* [PhysPsycho]. The number of nurses trained in palliative care [IntensiveRN] ( $\gamma = 0.07$ ,  $p = 0.013$ ), *variety of relaxation equipment* [varietyRelaxEqu] ( $\gamma = 0.20$ ,  $p < 0.001$ ), *research in palliative care* [ResearchPal] ( $\gamma = 0.23$ ,  $p < 0.001$ ), and *presence of designated areas for palliative patients* [PallArea] ( $\gamma = 0.07$ ,  $p = 0.013$ ) were significantly positively associated with *effective communication* [Communication]. *Sufficiency of medical staff* [Sufficiency] ( $\gamma = 0.14$ ,  $p = 0.014$ ), number of nurses trained in palliative care [IntensiveRN] ( $\gamma = 0.10$ ,  $p < 0.001$ ) and *variety of relaxation equipment* [varietyRelaxEqu] ( $\gamma = 0.23$ ,  $p < 0.001$ ) were significantly positively associated with *respect to patient* [Respect]. Furthermore, the two variables for staff competency, number of doctors trained in palliative care [IntensiveDR] ( $\gamma = 0.16$ ,  $p < 0.001$ ) and number of nurses trained in palliative care [IntensiveRN] ( $\gamma = 0.15$ ,  $p < 0.001$ ), had indirect influences on the three processes concerning good death variables through the variable *doctor's time spent with patient* [TimeDoc], which was significantly associated with *PhysPsycho* ( $\beta = 0.15$ ,  $p < 0.001$ ), *Communication* ( $\beta = 0.26$ ,  $p < 0.001$ ) and *Respect* ( $\beta = 0.11$ ,  $p = 0.026$ ). A total of 14%, 21% and 10% of the variations in the variables *PhysPsycho*, *Communication* and *Respect* were explained by this model. Model fit statistics show that the model fits well with the data ( $\chi^2/df = 2.705$ , GFI = 0.937, AGFI = 0.910, CFI = 0.940, RMSEA = 0.056, and SRMR = 0.0807). Table 3 shows standardized and unstandardized estimates of the associations between variables in the SEM model.

## Discussion

To our knowledge, this is the first nationwide study to explore the overall situation of facility-based palliative care in Thailand. Specifically, this study investigates how palliative care provision systems have been arranged in hospitals and whether they affect the process of care, which can enhance the quality of life of patients.

The results of this study indicate that the sufficiency and competency of the medical staff and hospitals' nonmedical structure regarding palliative care are associated with the process concerning good death, including the response to physical and psychological needs, effective communication and respect to patients.

Staffing in palliative care has been found to be associated with better quality of care. Hospitals with more availability of medical staff can provide consistent care and are more responsive to palliative care patients' needs [32-33]. In this study, doctors and nurses are the key staff members that contribute to the palliative care process. In addition to sufficiency, the competency of palliative care staff is crucial for the quality of palliative care provision. The number of doctors and number of nurses who had taken an intensive palliative care course was found to have a significant impact on the three aspects of the care process either directly or indirectly through the amount of time that the doctor spent with a patient. Spending more time with patients enables doctors to build a curative relationship and foster rapport, which demonstrates empathy and allows patients to express their psychosocial concerns [34]. This finding is supported by recent studies [35-39] showing that doctors spending more time discussing information about disease or treatment guidelines in prognostic conversations would give patients greater understanding about their illness and treatment options.

Although the time nurses spend with patients is not significantly associated with the process of care, palliative care nurses generally spend more time with patients and their families than other health professionals do [40-41]. In addition, the interactions between nurses and patients are more informal than those between patients and doctors. Palliative care nurses play the main roles in individualized care [42], detailed communication about treatment [43] and facilitation of patients' decision making regarding their end of life. The direct influences of the number of palliative care-trained nurses on effective communication and respect for patients imply the importance of the nonclinical functions of nurses in care practices that need to be strengthened in the context of palliative care.

These findings emphasize the importance of knowledge and skills specific to palliative care that improve the competency of medical staff in response to patient needs, leading to having end-of-life care discussions and planning with patients and families. However, the descriptive statistics from this study show that only 10% of participating hospitals had at least one doctor and 50% had at least one nurse who had received at least one month of training through an intensive course on palliative care. This finding confirms that palliative care training for both doctors and nurses through existing curricula in Thailand are still not adequate, as previously reported [1,6]. Therefore, promoting intensive training among medical staff should be considered a priority for the improvement of palliative care quality in the country. Given the differences in the detailed functions of doctors and nurses, palliative care courses could be designed specifically for different medical professions to optimize the knowledge and skills obtained.

Although we found clear differences in some structural components in terms of the variety of medical professions in the multidisciplinary team, availability of medical equipment and availability of medication for palliative care patients across hospitals with different levels of capacity, the associations between these medically related components and the process of care were not significant. On the other hand, nonmedical components such as availability of relaxation equipment, allocation of specific areas for palliative care patients and research in palliative care appear to be related to the process concerning

good death. These managerial structure variables could imply how much a hospital is capable of and gives value to palliative care provision.

In the palliative care context, relaxation equipment such as music and prayer recordings have been found to reduce pain while promoting relaxation and relieving anxiety and depression in patients [44-46]. In the predominantly Buddhist Thai society, patients and families facing the end-of-life stage of disease are likely to listen to Dharmic recordings and read Dharmic books. It is believed that patients and their families can learn to accept, prepare and plan as they make the decision to discontinue invasive treatments and unnecessary life-prolonging procedures. Thai society remains largely based upon religious guidelines; hence, religious activities for followers of different religions, such as prayers, Quran reading, and anointing, are commonly observed with the presence of clergymen or Buddhist monks in hospitals [47]. Religious patients can then cope with the physical, psychological and spiritual effects of the final stage of life. These practices can lead to good death [48-49]. Having a variety of relaxation equipment may indicate that hospitals' preparedness extends beyond physical and psychosocial care to spiritual care and respect for patients' dignity. This explains the relationship between the variety of relaxation equipment and all three aspects of the process concerning good death.

The allocation of specific areas to serve palliative care patients can lead to a better process of care, particularly for the communication of sensitive issues [50]. Thai medical practitioners are expected to follow the guidelines for palliative care communication, particularly when delivering bad news and discussing care planning with patients and family members [11, 51]. These are sensitive issues that might have psychological impacts on patients whose conditions are clinically unstable or made complex by the symptoms of disease. Staying in an organized, private zone with those whom patients are familiar with would have positive effects on patient quality of life [52]. The significant association between having a designated area specifically for palliative care and effective communication, in one way, suggests that the challenges to palliative care communication could be overcome if hospitals take into consideration the necessity of physical space for patients and their family caregivers.

Research in palliative care might lead to practice guidelines, quality indicators or specific tools for better care performance [53-54]. Hospitals that have conducted research in palliative care were found to have a better quality of care process in terms of response to patients' needs and effective communication. As mentioned earlier, most hospitals in Thailand reported following guidelines developed in their specific facility [12], which implies a wider interest in improving the quality of palliative care at the facility level. However, the number of hospitals that have experience in conducting research, as found from this study, is quite limited. Among the palliative care studies that have been performed so far, most are descriptive, and there is little intervention research related to the promotion of quality of life among patients and their families [1]. Although this study was not an intervention study, it confirms the significance of research at the facility level for the improvement of the palliative care process.

In this study, setting, we cannot capture the differences in the quality of the palliative care process concerning good death between hospitals with higher and lower medical capacity. This might be due to

the nature of palliative care, which relies more on psycho-social-spiritual aspects of care in which patients' physical conditions can be managed well even with less advanced medical equipment and medication. It should be noted that both financial and technical support are vital for the investment in improving human resources, medical and nonmedical equipment, the physical environment and other related resources of care. As such, hospitals' managerial philosophy and organizational culture would majorly contribute to this matter. For future studies, hospitals' structural characteristics, particularly managerial and cultural aspects of healthcare organizations, should be included to systematically explain more details of palliative care quality management.

This study employs Donabedian's S-P-O framework by assuming that the quality of structure and process of palliative care would lead to the ultimate outcome of good death. However, no actual outcome data were directly collected in this study for two main reasons. First, palliative care outcomes have been measured in different ways, mostly in terms of satisfaction of care provided, not in terms of good death and the dying process. There is no standard quantification of palliative care outcomes that we can observe in the study setting. Second, this is a cross-sectional study, so the interpretation of causal linkages from structure to process to outcome, according to the theory, is limited. However, the structure and process measures of, for example, the availability and competency of human resources, the availability of pain killers, psychosocial support for patients and families and support for shared decision making are among the indicators for the Quality of Good Death Index [55]. We believe that the study results indicate what structural components are essential for better care processes and how palliative care provision should be designed at the facility level.

Having an organization as a unit of analysis generally requires objective measurement of organizational-level variables. Thailand is in an active phase of developing guidelines and quality standards for palliative care [9, 56]; however, as mentioned earlier, hospitals apply different performance indicators. Therefore, we used objectively observed variables that can be commonly obtained from any hospital to construct the measurement models for the three aspects of care. Accordingly, these data allowed us to conduct a quantitative evaluation of the overall situation and a comparison of palliative care provision performance across medical facilities nationwide despite a standard quality measurement not yet being available.

This study has some limitations that need to be addressed. First, the study setting is limited to only institutional care, which mostly involves patients approaching the end of life. Even though medically related structural components and staff specialization were not found to be significant predictors of the palliative care process in this study, we cannot conclude that they are not important. Palliative patients in different stages of disease progression may have different needs for the structure and process of care. The specific needs of patients in stages of different disease progression could be further explored. Second, this study uses objective measurement to obtain the data that any hospital can provide; however, it fully relies on primary data collection using questionnaires self-administered by hospital representatives. Some information may be obtained from estimations and thus has the possibility of response bias. Facility- and national-level databases that include standard indicators for palliative care

should be developed to facilitate potential research for quality improvement. Third, the structure of care is operationalized using directly observable components such as numbers, variety and presence of human and physical resources, while organizational context such as managerial styles, culture, leadership, policies and other organizational-level factors that might affect how palliative care is managed and provided are not included. This limits the interpretation of the study findings in terms of how a medical facility should manage to obtain a better quality of palliative care. Future studies on the role of structural characteristics of hospitals in determining the quality of palliative care are encouraged.

## **Conclusion**

This is the first nationwide study to explore and investigate the associations between the structure and process of palliative care in hospitals. The study revealed that the sufficiency and competency of palliative care doctors and nurses, together with the presence of nonmedical equipment, the allocation of physical space, and the presence of research related to palliative care, are associated with the process concerning good death; these factors are responses to patients' physical and psychological needs, effective communication and respect to patients' dignity. Financial and technical support at the facility and national levels for investment in the structural components of care is essential for the improvement of the quality of palliative care and patient quality of life.

## **Declarations**

### **Ethics approval and consent to participate**

Ethical approval for the study was granted by the ethical review board of the Faculty of Social Sciences and Humanities, Mahidol University (Certificate of Approval No.: 2017/185.0509) (MU-SSIRB No.: 2017/222 (B2) and the participating hospitals that required the study to be approved by their own ethics committee. All participants provided written informed consent before completing the questionnaire. We confirm that all methods were carried out in accordance with institutional ethics guidelines and regulations.

### **Consent for publication**

Not applicable

### **Availability of data and materials**

The dataset used in the current study are not publicly available given the conditions stated in the informed consent form to protect the identity of the participants. However, the dataset is available from the corresponding author on reasonable request.

### **Competing interests**

The authors declare that they have no competing interests.

## Funding

Not applicable

## Author's contributions

PD conducted literature review, designed research instrument, collected data, and performed statistical analysis. NM developed the study protocol and interpreted the data. SCP and ST designed research instrument and interpreted the data. PD and NM were major contributors in writing the manuscript. All authors read and approved the final manuscript.

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## Tables

**Table 1 Characteristics of the Study Sample** (n = 542)

<b>Variables</b>	<b>Frequency (%)</b>	<b>Mean</b>	<b>SD</b>
Hospital Size			
Number of beds		103.15	147.12
Sufficiency of Medical Personnel			
Doctor-to-Palliative Patient Ratio		0.38	0.42
Nurse-to-Palliative Patient Ratio		1.61	2.11
Staff Competency			
Palliative care-trained doctors in facility (Yes)	56 (10.33)		
(Number of trained doctors in facility)		0.15	0.57
Palliative care-trained nurses in facility (Yes)	274 (50.55)		
(Number of trained nurses in facility)		0.81	1.13
Types of Multidisciplinary Team Members			
Social Workers in multidisciplinary team (Yes)	63 (11.62)		
(Number of social workers in team)		0.13	0.36
Psychologists in multidisciplinary team (Yes)	182 (33.58)		
(Number of psychologists in team)		0.35	0.50
Variety of Professions in Multidisciplinary Team		5.13	1.55
Variety of Medical Equipment in Facility		3.24	0.77
Syringe drivers (Yes)	241 (44.46)		
Infusion pumps (Yes)	346 (63.84)		
Oxygen concentrators (Yes)	369 (68.08)		
Airbeds (Yes)	424 (78.23)		
Variety of Relaxation Equipment in Facility		3.48	1.70
Prayer room (Islam) (Yes)	60 (11.07)		
Video (Yes)	93 (17.16)		
Tabernacle (Yes)	123 (22.69)		
Radio (Yes)	232 (42.80)		
TV (Yes)	241 (44.46)		
Magazine/Newspaper/Cartoon (Yes)	256 (47.23)		

Variables	Frequency (%)	Mean	SD
Dhamma cassette (Yes)	394 (72.69)		
Dhamma book (Yes)	485 (89.48)		
Availability of Medicine in Facility		4.35	1.81
Oxycodone (Yes)	6 (1.11)		
Methadone (Yes)	42 (7.75)		
Codeine (Yes)	78 (14.39)		
Fentanyl patch (Yes)	83 (15.31)		
Kapanol (Yes)	95 (17.53)		
Fentanyl injection (Yes)	121 (22.32)		
Morphine immediate release (Yes)	200 (36.90)		
Morphine syrup (Yes)	335 (61.81)		
MST (Yes)	341 (62.92)		
Morphine injection (Yes)	523 (96.49)		
Tramadol (Yes)	531 (97.97)		
Research in Palliative Care (Yes)	114 (21.03)		
Presence of Designated Area for Palliative Patients			
Non-specific area	350 (64.58)		
Palliative beds	161 (29.70)		
Palliative zone (apart from ward)	28 (5.17)		
Palliative ward	3 (0.55)		
Time Spent per patient (minutes)			
Doctor		22.19	13.00
Nurse		40.14	15.30

**Table 2** Reliability and Validity of Palliative Care Process Latent Variables (n = 542)

Latent Variables	Internal consistency Cronbach's $\alpha$	Corrected Item-Total Correlation	Cronbach's $\alpha$ of Domain if Item Deleted	CFA Factor loading
Response to Physical and Psychological Needs	0.88			
Pain management		0.59	0.88	.64***
Delirium management		0.72	0.85	.71***
Depression management		0.75	0.85	.75***
Spiritual Care management		0.78	0.84	.88***
Bereavement Care management		0.74	0.85	.83***
Effective Communication	0.83			
Breaking bad news		0.64	0.79	.72***
Advance care planning		0.68	0.78	.78***
Breaking bad news team		0.66	0.79	.72***
Advance care planning team		0.65	0.79	.75***
Respect to Patient	0.45			
Decision-making		0.40	0.25	.77***
Living will		0.19	0.71*	.23***
Place of death		0.37	0.24	.72***
All 11 items	0.90			

\* removed from the model

\*\*\* p < .01

Model fit index of CFA for the response to physical and psychological needs:  $\chi^2/df = 1.713$  (p-value = 0.144), GFI = 0.995, AGFI = 0.982, CFI = 0.998, RMSEA = 0.036, and SRMR = 0.0120

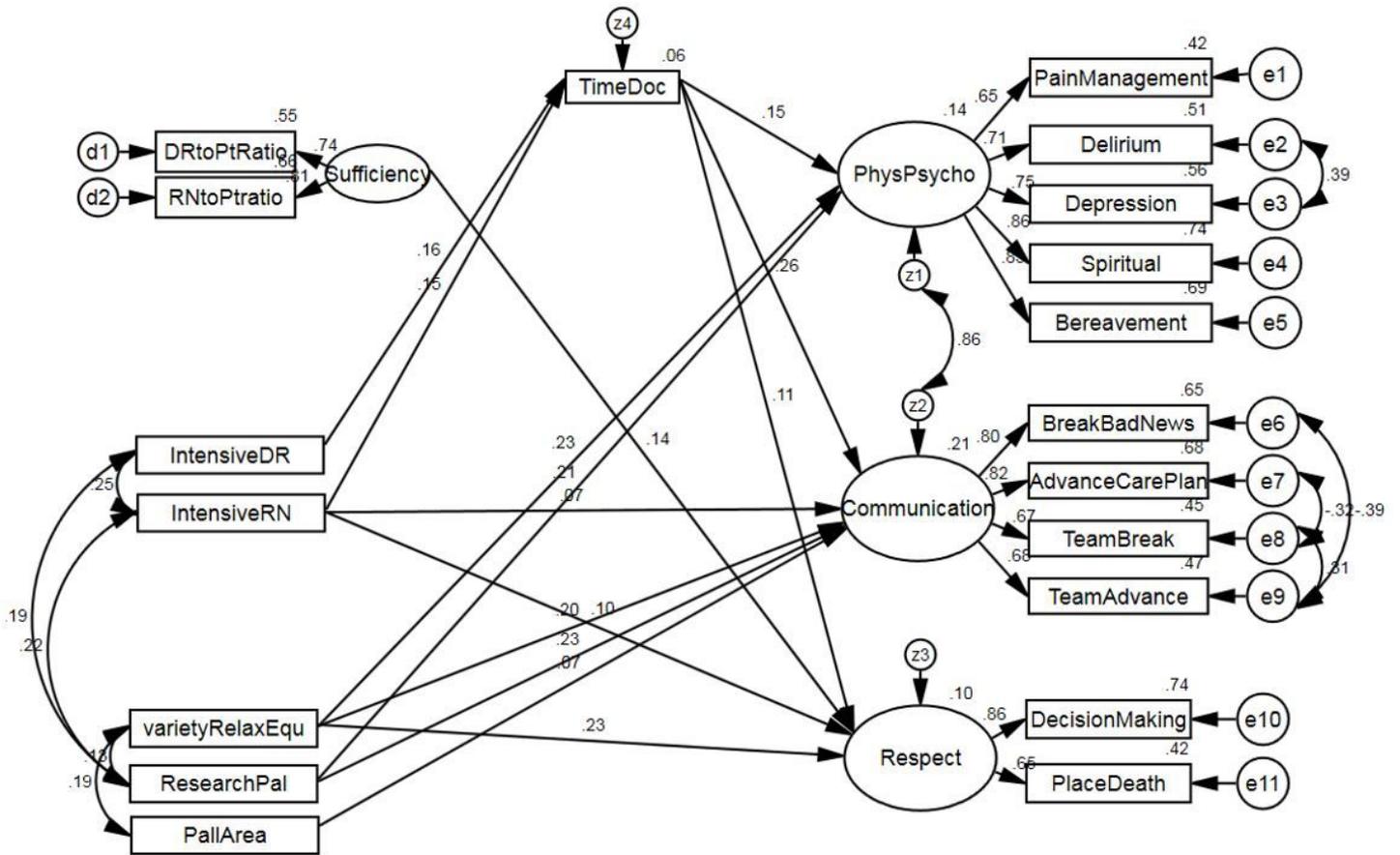
Model fit index of CFA for effective communication:  $\chi^2/df = 0.419$  (p-value = 0.518), GFI = 1.000, AGFI = 0.996, CFI = 1.000, RMSEA = 0.000, and SRMR = 0.0051

Model fit index of CFA for the Respect to patient: -

**Table 3** - Parameter Estimates for the Revised Model

<b>Variables</b>			<b>Standardized Regression Coefficient</b>	<b>Unstandardized Regression Coefficient</b>	<b>S.E.</b>	<b>C.R.</b>
TimeDoc	<- -	IntensiveDR	0.16	3.60	0.98	3.66***
TimeDoc	<- -	IntensiveRN	0.15	1.76	0.49	3.56***
PhysPsycho	<- -	varietyRelaxEqu	0.23	3.57	0.70	5.07***
PhysPsycho	<- -	ResearchPal	0.21	13.83	2.94	4.71***
PhysPsycho	<- -	TimeDoc	0.15	0.31	0.09	3.48***
Communication	<- -	IntensiveRN	0.07	2.28	0.92	2.48**
Communication	<- -	ResearchPal	0.23	20.48	3.76	5.44***
Communication	<- -	PallArea	0.07	2.74	1.10	2.48**
Communication	<- -	varietyRelaxEqu	0.20	4.15	0.89	4.65***
Communication	<- -	TimeDoc	0.26	0.70	0.12	6.01***
Respect	<- -	varietyRelaxEqu	0.23	2.31	0.49	4.75***
Respect	<- -	Sufficiency	0.14	7.97	3.24	2.46**
Respect	<- -	TimeDoc	0.11	0.14	0.06	2.23**
Respect	<- -	IntensiveRN	0.10	1.61	0.73	2.19**
** p < 0.05 *** p < 0.01						

# Figures



**Figure 2**

A Revised SEM Model for Palliative Care Quality