Original Article

A Comparison of Healthcare Utilization between Older Patients with and without Cancer at a University Hospital in Thailand

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Objective: To compare the health care utilization and address the appropriate time to optimize the palliative care provided between cancer and non-cancer older patients.

Materials and Methods: A retrospective review of patients at least 60 years old admitted and discharged alive in 2013 was investigated. The patients were selected and classified into the cancer and the non-cancer groups, according to the criteria of advanced diseases. Any health care utilization and advance care planning documentation (ACP) were collected. The deceased data of patients were retrieved from the Bureau of Registration Administration in January 2018, and the time interval to death was recorded. Comparison between both groups was performed.

Results: There were 130 cancer patients and 176 non-cancer patients. The median length of hospitalization of the non-cancer group and the cancer group was 11 and 7 days, respectively ($p<0.001$). The rate of performed endotracheal intubation and tracheostomy were higher in the non-cancer group ($p<0.001$). Moreover, in the non-cancer group, the health care costs of the last admission in 2013 were three times higher than those in the cancer group ($p<0.001$). Additionally, the median time interval to dead from last discharge date in 2013 until January 2018 was significantly longer in the non-cancer group, compared to the cancer group (347 (0 to 1,653) days and 81 (0 to 1,349) days, respectively, $p<0.001$).

Conclusion: In the non-cancer group, the health care utilization was higher. Therefore, optimally provided palliative care and ACP for the patients with advanced illnesses, especially the non-cancer patients with the suitable criteria for advanced diseases might improve quality of care and decrease the futile invasive procedures and the health care costs.

Keywords: Palliative care, Advance care planning, Cancer patients, Non-cancer patients, Advanced diseases, Health care utilization, Health care costs, Invasive procedures

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Advancements in medicine have resulted in people living longer lives, including people that have multiple illnesses. Longer life expectancy is also associated with disabilities and dependencies that can adversely affect quality of life and the costs of care. Moreover, many invasive interventions might be introduced to the patients towards the end of their lives that provides limited benefits and probably prolong their suffering[1]. A previous study reported several futile invasive procedures carried out in terminally-ill patients at the northern university hospital in Thailand[2]. However, if the prognostic information of the disease was given to Thai older patients, they might prefer not to prolong their suffering when their chance of survival is small[3,4].

Palliative care is an arrangement of holistic care for patients and their families facing the problems associated with life-threatening illnesses, through the prevention and relief of suffering and promoting physical, psychosocial, and spiritual care[1]. Many studies reported that optimal palliative care could lead to better quality of care for terminally ill patients with potentially lower health care costs[5-9]. Moreover, palliative care aim is not only for cancer patients but

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also for other advanced disease patients. Therefore, incorporating the concept of palliative care at optimal time for older patients with chronic illnesses would be an ideal, however, it would be challenging to deliver in real life practice. In Thailand, there are not enough evidence about appropriate palliative care provided for those patients[10], particularly in non-cancer patients. Therefore, the present study aimed to compare the older cancer patients and the non-cancer patients with respect to the health care utilization and the proper time to provide the optimal palliative care.

Objective

The objectives are to compare the health care utilization, including unplanned outpatient visits, hospital stay data, interventions, palliative care consultation, the health care costs, and survival time among the cancer and the non-cancer older patients admitted at the medical wards and discharged alive in 2013 at Siriraj hospital, and to address an appropriate time to maximize palliative care in the patients with advanced stage of their illnesses.

Materials and Methods

Study design

A retrospective cohort study was conducted at Siriraj Hospital. The electronic medical records of older patients that were 60-years-old or older admitted at the medical ward in the hospital and discharged alive in 2013 were reviewed. The patients with advanced disease, including the cancer and the non-cancer patients were enrolled, according to an extensive range of criteria[11,12] (Table 1). The only exclusion was incomplete medical record. The protocol for the present study was approved by the Siriraj Institutional Review Board.

Data collection

Data from all available medical records of the eligible patients, which included both outpatient and inpatient settings only in Siriraj hospital, were reviewed. The information collected was related to the patients' characteristics consisting of their demographic data, medical co-morbidities, and functional status. The number of admissions to medical ward during 2013 and the data before the last admission in 2013, including unplanned emergency room and outpatient department visits within six months and advance care planning (ACP) documentation were collected. The details of related events occurring during the last admission in 2013 (such as length of hospital stay, documentation of ACP discussion, the total costs of care, and all performed interventions, including invasive procedures) were collected. The deceased data of participants were retrieved from the Bureau of Registration Administration in January 2018.

Outcome measures

The primary outcome in the study was to compare healthcare utilization in the last admission in 2013 (such as admission to intensive care unit (ICU), length of hospital stay, invasive procedures performed, and health care costs) between the cancer and the non-cancer groups. The time interval to death from the day of last discharge in 2013 was also reported as the secondary outcome.

Statistical analysis

Baseline characteristics were analyzed by using descriptive statistics. Continuous variables were tested for normality, and comparisons were made by using either the independent sample t-test or the Mann-Whitney U test, according to the distribution of the data. The categorical variables were analyzed by using the chi-squared test and Fisher's exact test was used for categorical data with a count of less than 5. Categorical data are shown as number and percentage. Continuous data are given as mean ± standard deviation for normally distributed data, and as median and range for non-normally distributed data. A two-tailed p-value of less than 0.05 was considered statistically significant. All analyses were performed by using SPSS Statistics for Windows, version 18.0 (SPSS Inc., Chicago, IL, USA).

Ethics approval

The protocol for the present study was approved by the Siriraj Institutional Review Board (SIRB) of the Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok, Thailand.

Results

Participant characteristics

Five thousand three hundred fifteen patients were admitted to medical wards at Siriraj Hospital and discharged alive in 2013. Three hundred six patients meeting the inclusion criteria were divided into two groups, 130 cancer patients and 176 non-cancer patients. The mean age of cancer patients and non-cancer patients was 73 years and 78 years, respectively. Relative to functional status, there was a much higher proportion of total dependence in the non-cancer group than in the cancer group (81.8% versus 14.6%, respectively) (Table 2).

Table 1. The criteria used in the study to define advanced disease for each specific disease or condition (adapted from Stuart[11] and Knaus et al[12])

Diseases or conditions	Criteria
Advanced cancer	Metastatic cancer patients not suitable for chemotherapy decided by treating physicians
Severe dementia	Dementia with total dependence of basic activities of daily living
Bedridden status	Bed bounded and not able to communicate with caregiver ≥6 months
Advanced heart disease	Both must be present
	- Significant symptoms of recurrent congestive heart failure, dyspnea at rest classified as NYHA Class IV
	- Uncontrolled cardiac disease on optimal treatment with medications or not to be candidates for invasive procedures (echocardiography showed ejection fraction <20%)
Advanced renal disease	Both must be present
	- The patient decline dialysis or renal transplant
	- Creatinine clearance <10 mL/minute and serum creatinine >8.0 mg/dL
	Supporting documentation (optional)
	- Uremia or uremic pericarditis
	- Urine output <400 mL/day
	- Hepatorenal syndrome
	- Intractable hyperkalemia (>7.0 mmol/L) not responsive to treatment
	- Intractable fluid overload, not responsive to treatment
Advanced lung disease	Both must be present
	- Severe chronic lung disease as documented by both a and b
	a. Disabling dyspnea at rest, poorly or unresponsive to bronchodilators (FEV1 <30%)
	b. Progression of end stage pulmonary disease, as evidenced by increasing visits to the emergency department >1 time/year or hospitalizations for pulmonary infections or respiratory failure
	- Hypoxemia with evidence characterized by oxygen saturation ≤88% (room air) or the partial pressure of arterial oxygen ≤55 mmHg
Advanced liver disease	Both must be present
	- At least one of the following
	a. Ascites, refractory to treatment
	b. Spontaneous bacterial peritonitis
	c. Hepatorenal syndrome (elevated creatinine and blood urea nitrogen with oliguria (urine output <400 mL/day)
	d. Hepatic encephalopathy, refractory to treatment
	e. Recurrent variceal bleeding, despite intensive therapy
	- Evidenced with both a and b
	a. Prothrombin time >5 seconds, or INR >1.5
	b. Serum albumin <2.5 gm/dL

NYHA=New York Heart Association Classification; FEV1=forced expiratory volume in one second; INR=international normalized ratio

In the cancer group, most patients with metastatic cancer had lung cancer (23.8%), followed by cholangiocarcinoma (18.5%), and pancreatic and periampullary cancer (9.2%) (Figure 1). Nearly half of participants in the non-cancer group presented with severe dementia and/or bed-ridden status (Table 3).

Hospital stay data

The rate of ICU admissions was not different between the two groups. However, the non-cancer group had a longer length of hospital stay and a higher rate of performed endotracheal intubation and tracheostomy tube ($p<0.001$), whereas there

Table 2. Baseline characteristics of the cancer and the non-cancer groups

Characteristics	Cancer group (n=130) n (%)	Non-cancer group (n=176) n (%)	p-value
Age (years), Mean±SD	73.3±8.2	78.3±8.5	<0.001
Sex: male	65 (50.0)	80 (45.5)	0.43
Religion			0.67
Buddhism	129 (99.2)	174 (98.8)	
Christianity	1 (0.8)	1 (0.6)	
Islam	0 (0.0)	1 (0.6)	
Health coverage			0.40
Universal coverage	29 (22.3)	29 (16.5)	
Social security insurance	1 (0.8)	2 (1.1)	
Civil service welfare	80 (61.5)	125 (71.0)	
Self-payment	17 (13.1)	15 (8.5)	
Disability	3 (2.3)	5 (2.8)	
Number of comorbidities, Median (min-max)	3 (1 to 7)	4 (1 to 7)	<0.001
Comorbidities			
Hypertension	75 (57.7)	125 (71.0)	0.01
Type 2 diabetes	55 (42.3)	74 (42.0)	0.96
Hyperlipidemia	46 (35.4)	65 (36.9)	0.78
Coronary artery disease	11 (8.5)	26 (14.8)	0.09
Cerebrovascular disease	8 (6.2)	91 (51.7)	<0.001
Dementia	4 (3.1)	91 (51.7)	<0.001
Chronic liver disease	9 (6.9)	19 (10.8)	0.24
Chronic kidney disease	12 (9.2)	25 (14.2)	0.18
Diseases of the respiratory system	8 (6.2)	26 (14.8)	0.02
Malignancy	130 (100)	8 (4.5)	<0.001
Parkinson disease	2 (1.5)	29 (16.5)	<0.001
Functional status			<0.001
Independence	30 (23.1)	3 (1.7)	
Partial dependence	81 (62.3)	29 (16.5)	
Total dependence	19 (14.6)	144 (81.8)	
Unplanned ER/OPD visit within 6 months before admission	79 (60.8)	106 (60.2)	0.92
The number of unplanned ER/OPD visit within 6 months before admission, Median (min-max)	1.0 (0 to 10)	1.0 (0 to 8)	0.35
ACP documentation before the last admission in 2013	23 (17.7)	68 (38.6)	<0.001

SD=standard deviation; ER=emergency room; OPD=outpatient department; ACP=advance care planning

was no significant difference in cardiopulmonary resuscitation between the groups. The health care costs per person of the last admission was higher in the non-cancer group (p=0.002) (Table 4).

Deceased data

A public records search conducted in January 2018 revealed that almost 20% of patients in the non-cancer group were still alive, compared with

Table 3. Types of advanced diseases compared between the cancer and non-cancer groups*

Diseases	Cancer group (n=130) n (%)	Non-cancer group (n=176) n (%)
Metastatic cancer	130 (100)	1** (0.6)
Severe dementia	1 (0.8)	91 (51.7)
Bed-ridden ≥ 6 months	1 (0.8)	85 (48.3)
Advanced heart disease	0 (0.0)	3 (1.7)
Advanced lung disease	0 (0.0)	16 (9.1)
Advanced liver disease	1 (0.8)	13 (7.4)
Advanced renal disease	0 (0.0)	2 (1.1)

* Some patients in this study met the criteria for more than 1 advanced disease

** One patient in the non-cancer group had already been classified at the index date with status of bed-ridden ≥6 months criteria, but he was found to have metastatic cancer later on in his last admission in 2013

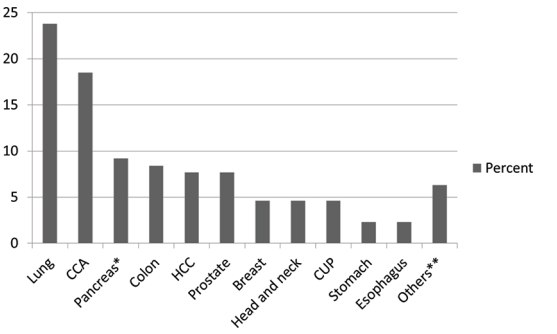

Figure 1. Types of cancer in the cancer group.

CCA, cholangiocarcinoma; HCC, hepatocellular carcinoma; CUP, cancer of unknown primary

* Pancreas and periampullary carcinoma

** Diffuse large B cell lymphoma (1.4%), urothelial cancer (1.4%), endometrial cancer (0.7%), ovarian cancer (0.7%), primary peritoneal cancer (0.7%), renal cell carcinoma (0.7%), connective tissue cancer (0.7%)

only 5% of patients in the cancer group (p<0.001). Respiratory tract infection was the major cause of death in the non-cancer group. The non-cancer group had a significantly longer time interval to death than the cancer group (p<0.001). Patients with advanced lung disease had the longest median survival time [418 (2 to 1,128) days], followed by severe dementia [395 (0 to 1,653) days], bed-ridden status [223 (0 to 1,448) days], advanced heart disease [187 (1 to 403) days], advanced liver disease [158 (0 to 1,330) days], and advanced renal disease [82 (42 to 123) days] (Table 5).

Discussion

The present study focused on the group of older patients who deem to optimize palliative care but received several invasive procedures, particularly those in the non-cancer group. The overall cost of healthcare was higher in the non-cancer group compared to the cancer patients. The finding is in accordance with a study conducted in Hong Kong[13]

Table 4. Healthcare utilization and ACP documentation during the last admission in 2013 compared between the cancer and non-cancer groups

Factors	Cancer group (n=130) n (%)	Non-cancer group (n=176) n (%)	p-value
Intensive care unit stay	2 (1.5)	7 (4.0)	0.19
Length of hospital stay (days), Median (min-max)	7 (1 to 107)	11 (1 to 139)	<0.001
Endotracheal intubation	3 (2.3)	30 (17.0)	<0.001
Central venous catheterization	5 (3.8)	4 (2.3)	0.42
Cardiopulmonary resuscitation	0 (0.0)	2 (1.1)	0.13
Renal replacement therapy	1 (0.8)	4 (2.3)	0.28
Tracheostomy	0 (0.0)	11 (6.3)	<0.001
ACP documentation during admission	28 (21.5)	59 (33.5)	0.02
Palliative care service consultation	1 (0.8)	0 (0.0)	0.19
Healthcare cost per person (USD), Median (min-max)	2,500 (76 to 21,083)	6,451 (164 to 59,552)	0.002

ACP=advance care planning; USD=United States dollars

A p-value<0.05 indicates statistical significance

Table 5. Survival and mortality data as of January 2018 compared between the cancer and non-cancer groups

Data	Cancer group (n=130) n (%)	Non-cancer group (n=176) n (%)	p-value
Still alive	7 (5.4)	35 (19.9)	<0.001
Causes of death			<0.001
Cancer	97 (74.6)	11 (6.3)	
Respiratory tract infection	5 (3.8)	36 (20.5)	
Cardiovascular disease	1 (0.8)	5 (2.8)	
Cerebrovascular disease	1 (0.8)	17 (9.7)	
Chronic lung disease	1 (0.8)	9 (5.1)	
Chronic kidney disease	0 (0.0)	2 (1.1)	
Chronic liver disease	2 (1.1)	4 (2.3)	
Senility	7 (5.4)	30 (17.0)	
Septicemia	5 (3.8)	16 (9.1)	
Others*	4 (3.1)	11 (6.3)	
Time interval to death (days), Median (min-max)**	81 (0 to 1,349)	347 (0 to 1,653)	<0.001

* Causes of death included hypertension, diabetes mellitus, airway obstruction, tuberculosis, cerebral contusion from accident, bone marrow failure, murder, and unknown causes of death

** From the last discharge date in 2013

A p-value <0.05 indicates statistical significance

for which the non-cancer patients with advanced disease also received higher rates of invasive procedures compared to advanced cancer patients. Considering the unpredictable disease trajectory in the non-cancer patients, it was possible that the treating physician had the goal of care despite that the patient had an advanced disease approaching terminal stage. Those lead to the higher numbers of invasive procedures performed and higher utilization of health care resources.

Several studies reported the benefit of consulting palliative care in terminally ill patients[5,7,14]. The present study revealed that consultations of the palliative care team was very low in both groups of population. Most of the care was carried out by the internal medicine team due to the limited resource of the palliative team in our hospital. Moreover, with the current system in our hospital, caring teams were mostly not the primary team of those with advanced disease. These factors might lead to a low number of patients receiving genuine palliative care and a high rate of invasive interventions for the non-cancer patients in the present study. Study to explore, whether adding palliative care specialist service or having primary care team to involve in the care process could have made any difference, is warranted.

Furthermore, when exploring the difference between the cancer and the non-cancer groups, rate of ACP documentation was higher in the non-cancer patients, but invasive procedures especially endotracheal intubation was not necessarily reduced. It might be intuitive that the prognosis of advanced cancer patients is more predictable and better accepted by patients and their family. They might be more prepared and comfortable to 'let go' and refuse futile invasive procedures when the time comes. The finding brings to a further affirmation that more work is needed to be done for patients and physicians to be aware of suitable time for optimizing palliative care and ACP in the non-cancer patients when the end-of-life time is approaching.

The present study also endeavored to identify the proper time to optimize palliative care and initiate ACP in terminally ill older patients in both the cancer and the non-cancer groups. According to the simple question generally used to estimate the life expectancy of the patient, "Would I be surprised if this patient dies in the next 12 months?", the predictive timing referring to patient's death would be around 12 months. In advanced cancer patients, the median time interval to death in the present study was only 81 days, so optimizing palliative care and ACP were provided to

patients as soon as they were diagnosed with advanced cancer according to the advanced disease criteria. In the non-cancer group, a diagnosis of advanced heart, liver, and renal disease as defined by the criteria used in the present study may be a good time to optimize palliative care and initiate ACP, because the survival time of this group of patients was only about 1 year after the diagnosis of advanced disease. However, more intensive criteria are needed to evaluate patients with severe dementia, bedridden status, and advanced lung disease before an optimal time to initiate ACP can be proposed.

To our knowledge, this is the first study attempts to identify survival time of advance stage of chronic illnesses using the proposed criteria by including a large number of patients. There were some limitations due to the nature of retrospective study and taking place in only one tertiary hospital. Some information, especially the healthcare utilization might be under-reported in the study. Additionally, the prevalence of documented ACP might be lower than truly performed ACP because ACP could have been verbally conducted.

Conclusion

Providing palliative care at appropriate time should be considered in routine practice for caring of older patients with advanced diseases, both in the cancer and the non-cancer patients to maximize the quality of life of patients and their families, minimize unnecessary invasive procedures, and reduce the overall health care costs. The optimal palliative care and performing ACP in older patients with metastatic cancer, or advanced stage of heart, liver, and renal diseases might be provided when the clinical course of diseases are matched according to the study inclusion criteria.

What is already known on this topic?

Many previous studies showed that optimally provided palliative care in the patients with advanced disease led to improved quality of care, decrease futile invasive interventions, and decrease healthcare costs. However, some studies reported that for the non-cancer patients in the advanced stage of their illnesses, it might be difficult to determine the prognosis of the diseases, so they probably tended to receive futile life sustaining interventions. In Thailand, there are insufficient evidence of appropriate palliative care, especially for the non-cancer patients.

What this study adds?

In the non-cancer older patients, the healthcare utilization, including length of hospital stay, rate of performing invasive procedures, and costs of care was higher, and the survival time was longer. Therefore, providing palliative care to the patients with advanced disease, especially the non-cancer patients might improve quality of care and reduce healthcare utilization. The criteria used in the study to define advanced disease might be useful to guide physicians to optimally provide palliative care and initiate ACP to the patients who are eligible according to the criteria of metastatic cancer, or advanced stage of heart, liver, and renal diseases.

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Authors' contributions

Chattaris T: acquisition and interpretation of data, preparation of manuscript, and bibliographic search. Pitiyarn S: acquisition of data. Srinonprasert V: study concept and interpretation of data. Suraarunsumrit P: study concept, interpretation of data, bibliographic search, and revision of manuscript.

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Conflicts of interest

The authors hereby declare no personal or professional conflicts of interest relating to any aspect of this study.

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