

The one-year outcomes of life-sustaining treatments in intensive care units among cancer patients at the end of life stage in Taiwan: A retrospective design.

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Abstract

Background

Terminal cancer patients' admission to intensive care unit (ICU) remains a controversial issue and there is a lack of information about their prognosis after ICU life-sustaining treatments. This one-year study aimed to compare the impacts of life-sustaining treatments and utilization of hospital care prior to ICU admission on mortality rates between cancer and non-cancer patients at the end of life stage.

Methods

This study adopted a one-year longitudinal retrospective design. Data from chart reviewing at the general hospital with 44 beds of ICU included the terminally ill patients' demographic background, diseases, DNR status and life-sustaining treatments, utilization of hospital care one-year prior to ICU admission, and death at ICU and one-year post-ICU discharge.

Results

The higher mortality rates at ICU and one-year after ICU discharge were found in cancer group than non-cancer group (Odds ratio = 0.742; CI = 0.511–1.012, $p = 0.043$) (Odds ratio = 0.225; CI = 0.121–0.417, $p < 0.001$). Compared with non-cancer group (14%), there were lower withdrawal rates in cancer group (6.5%). No DNR designation prior to ICU admission and near half of families (49.4%) in cancer group refused to receive hospice care consultation in ICU. After adjusting for age and APACHE II scores, mechanical ventilation (Odds ratio = 2.242; CI = 1.354–4.705, $p = 0.027$), enteral nutrition (Odds ratio = 1.675; CI = 1.140–2.264, $p = 0.004$) and parenteral nutrition (Odds ratio = 1.460; CI = 0.747–2.626, $p = 0.029$) significantly increased the risk of ICU mortality rates among terminal cancer patients. Moreover, enteral nutrition also increased one-year mortality rates (Odds ratio = 1.558; CI = 1.112–1.985, $p = 0.014$). The higher usages of hospital care from general wards were found in cancer group than non-cancer group. There were no association between utilizations of hospital care and mortality rates.

Conclusions

Higher utilizations of hospital care and no DNR designation prior to ICU admission demonstrates the delay and barrier of Chinese patients and families' acceptance of hospice care at the end of life stage.

The higher ICU mortality rates and lower withdrawal rates urge professionals to develop cultural-sensitive family-centered hospice care program for terminal cancer patients in ICU.

Background

The review study [1] indicated that increasing cancer patients were admitted to intensive care unit (ICU) for managing organ dysfunction and their in-hospital mortality rates were not higher than critically ill noncancer patients. This review also indicated that according to the policies for ICU admission, terminal cancer patients' admission to ICU remains a controversial issue and life-sustaining treatments in ICU are not recommended for them. The recent review study [2] revealed that although cancer patients at the terminal stage might not benefit from ICU treatments, it was not uncommon that they were admitted to ICU for end of stage organ failure. However, it is not known about their mortality rates at ICU and after ICU discharge. Up to date, most studies evaluated the short-term one-month and rarely, 3 to 6-month survival rates. The recent review study [2] found that ICU treatments improve the short-term outcomes among cancer patients but the findings of the long-term mortality rates in cancer patients remain inconsistent. Moreover, there is a lack of study examining this issue among cancer patients at the end of life stage while their conditions are unlikely reversible under active treatments in ICU.

Because the quality of dying among terminally ill cancer patients might be more essential, it is better for them to receive palliative care and symptoms control in ICU than life-sustaining therapies [1]. Withdrawal of life-sustaining treatments is to help terminally ill patients receive hospice care in ICU [3]. However, the recent study indicated that the terminally ill patients often received high-intensity life-sustaining treatments [4]. The studies published in European countries found that the incidence rates of withdrawal of life-sustaining treatments were less than 10% [5-7]. In the global survey, withdrawal of life-sustaining treatments in ICUs in Asian countries were between 3% and 8% which were lower than the rates of 13% in both the United States and Europe [8]. Phua et al [9]. indicated that while there were the 25-30% incidences of withdrawing life-sustaining treatments in intensive care units among 16 Asia countries, Taiwan ranked 15th for the withdrawal rates of 3~4%. The results suggest that it is likely for Chinese patients with terminally ill condition to receive life-sustaining treatments in ICU. However, very few studies exist of examining the impacts of life-sustaining treatments on their ICU and long-term mortality rates. As a result, the limited information could be feedback to physicians, patients and families to make an end of life decision.

The global surveys found that mechanical ventilation and hemodialysis were the most withdraw treatments [8, 10, 11]. The inotropic agents were also identified as the most common withdraw treatments among the terminally ill patients [4]. Differently, physicians in Asia countries thought that mechanical ventilation was the most difficult to be withdrawn [9]. Withdrawing the following treatments are rarely discussed including antibiotics, nutrition, and intravenous fluids, and blood product transfusions [12]. Artificial nutrition considered as a way of expressing filial piety in Chinese societies is often not agreed to withdraw by families [9].

In 2009, in Taiwan, Hospice Palliative Care Act began to address that CPR and life-sustaining treatments should be withheld or withdrawn for patients who meet the criteria for Do Not Resuscitate (DNR) orders [8]. In Asian society, families often play the surrogates for ICU patients who are not able to participate in end of life discussion, and most families did not accept the limit life-sustaining treatments at the end of life. It is also the difficult experiences for western families to make end of life decision [13]. It is not clear

about to what extent Chinese families accept to receive hospice care consultation at ICU and their decision to withdrawal after the consultation. Therefore, this study aimed to compare the mortality rates of ICU admission and one year after ICU discharge, families' acceptance of hospice consultation care in ICU and their decision of withdrawal, and hospital utilizations prior to ICU admission between terminal cancer and non-cancer patients. utilization of hospital care prior to ICU admission. The impacts of life-sustaining treatments on mortality rates were also examined in terminal cancer patients. Moreover, the impacts of utilization of hospital care prior to ICU admission and life-sustaining treatments on mortality rates were also examined in terminal cancer patients.

Methods

Design and setting

This study adopted a retrospective longitudinal design with chart review method to collect and analyze the one-year data between January and December 2016 among terminally ill patients at four ICU units at the major medical center in Taiwan. Study ethics approval was obtained on 29 Jun 2017 (Ethics Committee of National Taiwan University Hospital, IRB 201705120RINA). Data were analyzed without exposure of the patients' personal information. The primary objectives were to identify the mortality rates during ICU admission and one year after discharge and the impacts of life-sustaining treatments on mortality rates. The secondary objective was to assess the utilizations of hospital care prior to ICU admission on mortality rates.

Study population

Medical records of the patients who were diagnosed as terminally ill patients by two specialist physicians and signed a DNR form at the time of study were the inclusion criteria for our subjects. Data were analyzed based on total 326 patients: 154 cancer patients and 172 non-cancer patients.

Data collection

Data were collected using REDCap (Research Electronic Data Capture) tool. Demographic data collected age, gender, marital status, religion, education, and insurance. Disease data included primary diagnosis, severity of disease condition (Acute Physiology and Chronic Health Evaluation [APACHE] II score, higher scores indicating more severe condition and a higher risk of death), DNR status before ICU admission, agreement on hospice care consultation, and life-sustaining treatments, utilization of hospital care from emergency department, ICU, and general wards one-year prior to ICU admission, durations of ICU stay, implementing of withdrawing life-sustaining treatments, and death at ICU and one-year post-ICU discharge.

Statistical analysis

SPSS Statistics Software 22.0 (SPSS Inc., Chicago, IL, USA) was used to analyze data, and $p < 0.05$ was adopted as the measure of statistical significance. Inferential statistics of *t*-tests, chi-squared tests,

logistic regression were applied to compare the clinical characteristics, use of hospital care prior to ICU admission, hospice care and life-sustaining treatments at ICU and mortality rates since ICU admission between cancer and non-cancer groups. To compare mortality between two groups and analyze the impacts of life-sustaining treatments on cancer patients' mortality in ICU, and at one-year ICU discharge, multivariate analysis using Cox regression adjusted for age, APACHE II score to calculate the hazard ratios (HRs) and their respective 95% confidence intervals. This association was also evaluated by a graphic representation of survival.

Results

Patient characteristics

Table 1 indicated that there were the significant differences in age and marital status. Compared with non-cancer group, the patients in cancer group were younger and more cancer patients lived with partner. There were no significant differences in other demographic data, DNR status before ICU admission, and disease severity levels according to APACHE II scores. About the disease severity levels, over half of the patients in two groups were moderate and severe. The majority of the primary caregivers were the immediate family members (i.e., parents, spouse, or children). As noted, they all did not had a DNR designation prior to ICU admission. In cancer group, over 30% suffered from hematological cancer followed by lung cancer, gastrointestinal cancer and other types of cancer.

Outcome analysis

Table 2 indicated that compared with non-cancer group (14%), there were lower withdrawal group in cancer group (6.5%) ($\chi^2=4.84$, $p= 0.028$). Families of terminal cancer patients showed lower agreements on receiving hospice care consultation than non-cancer terminal cancer patients (50.6% vs 60.5%, $\chi^2=4.05$, $p= 0.044$). Moreover, for families receiving hospice consultation, major of families (91%) did not want to withdraw life-sustaining treatments and intended to have active treatments for the patients. Table 2 indicated that while there was no significant difference in the length of ICU admission, more death numbers during ICU and one-year after ICU discharge occurred in cancer group than non-cancer group (66.9% vs 54.7%, $\chi^2=5.084$) (87.7% vs 79.1%, $\chi^2=4.227$, $p=0.039$). As shown figure 1 and figure 2, the higher mortality rates at ICU and one-year after ICU discharge were found in cancer group than non-cancer group (Odds ratio = 0.742; CI = 0.511-1.012, $p = 0.043$) (Odds ratio = 0.225; CI = 0.121-0.417, $p <0.001$).

Table 3 showed that after adjusting for age and APACHE II scores, the multivariate Cox analysis indicated that mechanical ventilation and enteral nutrition significantly increased the risk of ICU mortality rates among terminal cancer patients. As shown in Figure 3, compared with the cancer patients without mechanical ventilation, ICU mortality rates were significantly higher in the cancer patients receiving this life-sustaining treatment (Odds ratio = 2.242; CI = 1.354 - 4.705, $p = 0.027$). Similarly, figure 4 and figure 5 indicated that higher ICU mortality rates occurred in terminal cancer patients with enteral nutrition (Odds

ratio = 1.675; CI = 1.140-2.264, $p = 0.004$) and parenteral nutrition (Odds ratio = 1.460; CI = 0.747-2.626, $p = 0.029$). In Table 4 and Figure 6, the multivariate Cox analysis indicated that after adjusting for age and APACHE II scores, enteral nutrition significantly increased the risk of one-year mortality rates after discharge from ICU among terminal cancer patients (Odds ratio = 1.558; CI = 1.112-1.985, $p = 0.014$). On the other hand, Figure 7 showed that inotropic agents and vasopressor significantly decreased the one-year mortality rates among terminal cancer patients (Odds ratio = 0.544; CI = 0.133-2.372, $p = 0.013$).

Table 5 showed the utilization of hospital care one-year before they were admitted to ICU in two groups. The higher utilizations of hospital care were found in the cancer group than non-cancer group with only 5.8% not receiving the hospital care before they were admitted to ICU. Terminal cancer patients received more care from general wards than non-cancer terminal patients. Moreover, higher usage of care from general wards at five times and above was also found in cancer group than non-cancer group ($\chi^2=8.268$, $p= 0.004$). On the other hand, the patients in non-cancer group used more ICU services than cancer patients. For emergency service, there were no significant between two groups. However, utilization of hospital care one year prior to ICU admission was not associated with terminal cancer patients' short-term and long-term mortality rates.

Discussion

Our study found that the higher mortality rates at ICU (66.9% vs 54.7%) and one-year after ICU (87.7% vs 79.1%) occurred in cancer group than non-cancer group. Differently, the review study [1] indicated that there were no different ICU mortality rates between cancer and non-cancer patients. The inconsistent results suggest that the poor mortality rates in ICU likely occurred in cancer patients at terminal stage. Our mortality rates were comparatively higher than ICU mortality rates of 17.2% and a one-year mortality rate of 23.8% reported by Lobo et al [8], analyzing 84 countries. The cohort study found that compared with non-cancer group, Chinese cancer patients with stage IV after receiving CPR showed the lower post-discharge survival rates and poorer prognosis [14]. Cancer patients at stage IV predicting higher mortality rates in ICU was also observed in Western society [15]. Therefore, this study and our study supports that for terminal cancer patients, palliative care not CPR or life-sustaining treatment is more appropriate for their end of life quality [1].

This study indicated that compared with non-cancer group (14%), there were lower withdrawal rates at ICU in cancer group (6.5%). Terminal cancer patients' low withdrawal from life-sustaining treatments was significantly lower than the 13.9% [5], 17.8% [16], and 13.2% [8] reported in the recent studies on the ICU patients in western societies. Our study and the recent study indicated that the terminally ill patients often received high-intensity life-sustaining treatments [4]. Compared with families in non-cancer group (39.5%), near half of families (49.4%) in cancer group refused to hospice care consultation in ICU. Similar to the previous studies on end of life decision in Chinese society [17,18, 19], this study also indicated that the patients' family members were the primary decision makers for the withdrawal of life-sustaining treatments and most Chinese families of terminal cancer patients rejected the withdrawal of life-sustaining treatments in order to prolong the patient's life. The previous study also showed 79% Chinese

families chose not to withdrawal life-sustaining treatments for their family members with critical illness [20]. The cohort study in Taiwan [19] found that patient-caregiver agreement on life sustaining treatment-preference was poor-to-fair and families more preferred aggressive treatments than patients' wish. The previous studies [17,18, 21] indicated that the value of filial piety based on Confucian teaching (a Chinese theory of virtue ethics and deontology) influences adult children' caregiving behaviors which focus on task fulfillments and emphasizes the novel treatments to prolong life for their parents at the end of life stage. Confucian ethics of filial piety defines the duties and obligations between parents and children in order to remain hierarchy within the family system and family harmony [22]. This value drives children's motivations of caregiving for their elderly patients at the end of life to show their love, respect, and appreciation for the care they had received from their parents, and to avoid shame and guilt for not being a good child in Chinese cultural context [17,18, 21]. The results suggest that cultural value might influence Chinese families not to withdrawal of life-sustaining treatment which might show doing nothing for their love one as a result of their sense of guilt.

After adjusting for age and APACHE II scores, the multivariate Cox analysis indicated that mechanical ventilation, enteral and parenteral nutrition significantly increased the risk of ICU mortality rates among terminal cancer patients. The recent review study [2] also found that invasive mechanical ventilation predicted the higher hospital mortality in cancer patients. The study [23] demonstrated the positive correlation of mechanical ventilation with mortality rates might suggest that there were the negative impacts of mechanical ventilation on barotrauma, oxygen toxicity, hemodynamic compromise, ventilator-induced lung injury, ventilator-associated pneumonia, as well as local and systemic effects of tumor. Our study also showed that enteral nutrition increased both ICU and one-year mortality rates. The cohort study in Taiwan also found that while terminal cancer patients preferred to reject all life-sustaining treatments, their families wanted to continue with nutritional supports by intravenous or/and tube feeding [19]. The review study revealed that providing nutrition and hydration was perceived by families as the humanistic end of life care for terminal cancer patients [24]. Feeding might be considered by family members as the fundamental supportive care for the patients' to be alive and also as the way of expressing filial piety in Chinese societies [9, 25]. Not providing nutrition support might be considered not behaving as a "filial piety" child. As a result, they might receive social blame. Moreover, without nutrition support, in Chinese culture, people dying in hungry status might lead them to become a "starving soul" or "hungry ghost/spirit" [24]. Accordingly, Chinese families are reluctant to withdrawal nutrition support for terminal cancer patients. However, our study revealed that the negative impacts of nutrition support on poor survival rates for terminal cancer patients.

This study found that there was no DNR designation prior to ICU admission for two groups. Moreover, higher utilizations of hospital care from general wards were found in cancer group than non-cancer group. The results suggest that terminal cancer patients and their families could have the opportunities to discuss and achieve the agreements about end of life decision including DNR and withdrawal of life-sustaining treatments in general wards. Discussing about life-withdrawal treatments between Chinese cancer patients and their families is likely a cultural taboo [26]. As a result, the patient-caregiver agreement on withdrawal life-sustaining treatment is unlikely achieved. Therefore, future intervention

needs to be developed for terminal cancer patients and their families to facilitate their discussions not only DNR but also the preference to withdrawal life-sustaining treatments in general wards.

The study in Singapore also found that Chinese family was reluctant to accept their parent's cancer diagnosis at terminally stage and they chose for life-prolonging treatments over palliative care [18]. In Ho's case study showed that after understanding the impact of cultural value on the Chinese family making decision at the end of life with honor the family's wishes, this culturally sensitive communication can achieve a consensus and help the patient die peacefully. The study in the west [27] also emphasized that respecting the families' culture and belief and allowing their cultural practices and rituals such as care provided by traditional healers are considered as the form of supports for families with different ethnic groups. Moreover, helping families to be present with participating in direct care at the patient's bedside is also regarded as an effective form of support for families and communication between the family and the patient.

The main limitation of this study is related to the retrospective design with chart review method which depends on the availability and accuracy of the medical record. Future research with a prospective study design can also include the self-report of the patients and their families in data collection to explore their experiences of end of life decision and care.

Conclusions

Higher utilizations of hospital care at the general wards and no DNR designation prior to ICU admission, and lower acceptance of hospice consultation care demonstrates the delay and barrier of Chinese patients and families' acceptance of hospice care at the end of life stage. The higher ICU and one year after ICU discharge mortality rates and lower life-sustaining treatment withdrawal rates urge professionals to develop cultural-sensitive family-centered hospice care program for terminal cancer patients in ICU and the general wards. The training program for professionals needs to include conducting culturally sensitive communication about "good death" with patients and their families, assessment of the impact of cultural value on end of life decision, allowing cultural practices and rituals of traditional healers, involving families in participating in direct care, and providing bereavement care for family members.

Declarations

Ethics approval and consent to participate

This study was approved by the Institutional Review Board of National Taiwan University Hospital (201700512RINA) and conducted in accordance with the Declaration of Helsinki. The informed consent was waived by the same ethics committee that approved the study (National Taiwan University Hospital).

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

We declare that we have no competing interests.

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Authors' contributions

CWL, SCK, HCW, and FHH designed the study. CWL and FHH were the main writers of the manuscript. CWL and LCK reviewed and analyzed the data. All authors read and approved the final manuscript.

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Tables

Table 1 Demographic and disease data between cancer and non-cancer patients

	Cancer (N=154)	Non-Cancer (N=172)	<i>t/ x² / p value</i>
Age	59.27±13.31 (21~92)	69.14±16.25 (20~99)	<i>t</i> = 91.57, <i>p</i> =0.025*
Male	93(60.4%)	110(64%)	<i>x</i> ² =0.439, <i>p</i> = 0.507
Female	61(39.6%)	62(36%)	
Marital status			<i>x</i> ² =8.23, <i>p</i> = 0.004**
With partner	120(77.9%)	109(63.4%)	
Without partner	34(22.1%)	35(36.6%)	
Religious belief			<i>x</i> ² =0.041, <i>p</i> = 0.84
Yes	114(74%)	129(75%)	
No	40(26%)	43(25%)	
Education			<i>x</i> ² =0.865, <i>p</i> = 0.352
High school and below	100(64.9%)	120(69.8%)	
Junior school and above	54(35.1%)	52(30.2%)	
Medical decision person			<i>x</i> ² =0786, <i>p</i> = 0.375
Immediate family	136(88.3%)	157(91.3%)	
Other	18(11.7%)	15(8.7%)	
DNR status before ICU			
Yes	0(0%)	0(0%)	
No	154(100%)	172(100%)	
DNR status after ICU			
Yes	154(100%)	172(100%)	
No	0(0%)	0(0%)	
Type of cancer			
Neoplastic of hematologic	54(35.1%)		
Neoplastic of malignant	100(64.9%)		
APACHE II scores	26.39±8.24	26.5±8.825	<i>t</i> =34.741, <i>p</i> =0.811
0~14	12(7.8%)	9(5.2%)	
15~25	63(40.9%)	75(43.6%)	
26~35	59(38.3%)	62(36%)	
>35	20(13%)	26(15.1%)	

* $p < 0.05$ ** $p < 0.01$

Table 2 Withdrawal rates, hospice consultation care, death at ICU and one-year after ICU

	Cancer (N=154)	Non-Cancer (N=172)	<i>t/ x²/ p value</i>
Withdraw life-sustaining treatments			$x^2=4.84, p= 0.028^*$
Yes	10(6.5%)	24(14%)	
No	144(93.5%)	148(86%)	
Hospice consultation care			$x^2=4.05, p= 0.044^*$
Yes	78(50.6%)	68(39.5%)	
No	76(49.4%)	104(60.5%)	
Discuss for hospice with family			
Aggressive	71(91%)	61(89.7%)	
Consider	2(2.6%)	7(10.3%)	
Need to chew over	5(6.4%)	0	
Days of ICU stay	15.49(11.5)	14.94 (12)	$t=59.461, p=0.145$
Days of ICU mortality	15.4(11)	12.53(11)	$t=59.617, p=0.047^*$
Death at ICU	103(66.9%)	94(54.7%)	$x^2=5.084, p=0.024^*$
Death at one-year after ICU discharge	32(87.7%)	42(79.1%)	$x^2=4.277, p=0.039^*$
Death at fire-year after ICU discharge	19(100%)	30(82.6%)	

* $p < 0.05$

Table 3 The impacts of life-sustaining treatments on ICU mortality rates

	Exp (B) β	Standard error (SE)	Significant (<i>p</i> value)	Odds ratio (OR)	Exp (B) 95% C.I. Upper Lower
Mechanical ventilation	0.807	0.365	0.027*	2.242	1.354 4.705
Inotropic agents and vassopressor	-0.72	0.240	0.763	0.930	0.623 1.412
Renal replacement therapy	0.215	0.174	0.218	1.240	0.486 3.008
Enteral nutrition	0.516	0.181	0.004*	1.675	1.140 2.264
Parenteral nutrition	0.378	0.174	0.029*	1.460	0.747 2.626
Antimicrobial therapy	0.175	1.012	0.863	1.191	0.435 2.988
Pain control	-0.190	0.229	0.407	0.827	0.538 1.131
Cardiopulmonary Resuscitation	-0.399	0.357	0.263	0.671	0.417 1.018
Extra-corporeal membrane oxygenation	0.528	0.395	0.180	0.590	0.317 0.838

**p*<0.05

Table 4 The impacts of life-sustaining treatments on one-year mortality rates after ICU discharge

	Exp (B) β	Standard error (SE)	Significant (<i>p</i> value)	Odds ratio (OR)	Exp (B) 95% C.I. Upper Lower
Mechanical ventilation	0.376	0.365	0.304	1.456	0.806 1.894
Inotropic agents and vassopressor	-0.609	0.245	0.013*	0.544	0.133 2.372
Renal replacement therapy	0.074	0.171	0.664	1.077	0.992 1.027
Enteral nutrition	0.444	0.180	0.014*	1.558	1.112 1.985
Parenteral nutrition	0.169	0.173	0.957	1.184	0.905 1.532
Antimicrobial therapy	0.151	1.010	0.881	1.163	0.859 1.612
Pain control	-0.463	0.233	0.047*	0.629	0.453 0.864
Cardiopulmonary Resuscitation	-0.597	0.354	0.092	0.550	0.137 2.393
Extra-corporeal membrane oxygenation	-0.499	0.393	0.204	0.607	0.421 0.856

**p*<0.05

Table 5 Utilization of hospital care before admission to ICU

	Cancer (N=154)	Non-Cancer (N=172)	<i>t/ x</i> ² / <i>p</i> value
ER, ICU and general wards			<i>x</i> ² =11.196, <i>p</i> = 0.001***
Yes	145(94.2%)	141(82.0%)	
NO	9(5.8%)	31(18.0%)	
General wards	140(96.6%)	130(92.2%)	<i>x</i> ² =11.549, <i>p</i> = 0.009**
1~2 times	48(34.3%)	66(50.8%)	
3~4 times	34(24.3%)	30(23.1%)	
5 and above	58(41.4%)	34(26.1%)	
Emergency (ER)	82(59.6%)	89(91.8%)	<i>x</i> ² =1.882, <i>p</i> = 0.242
1~2 times	68(83.0%)	71(79.8%)	
3~4 times	12(14.6%)	14(15.7%)	
5 and above	2(2.4%)	4(4.5%)	
ICU	40(27.6%)	58(41.1%)	<i>x</i> ² =8.744, <i>p</i> = 0.033*
1~2 times	38(95%)	49(84.5%)	
3~4 times	1(2.5%)	7(12.1%)	
5 and above	1(2.5%)	2(3.4%)	

p*<0.05, *p*<0.01

Figures

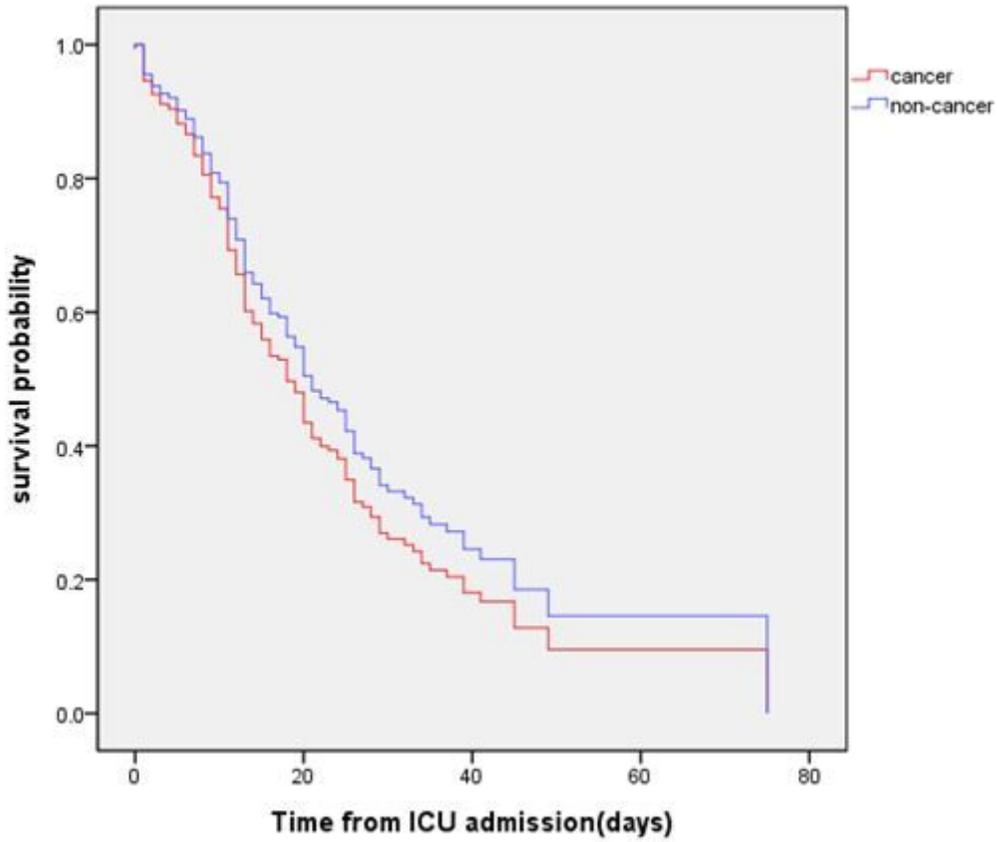


Figure 1

ICU survival rates between cancer and non-cancer groups

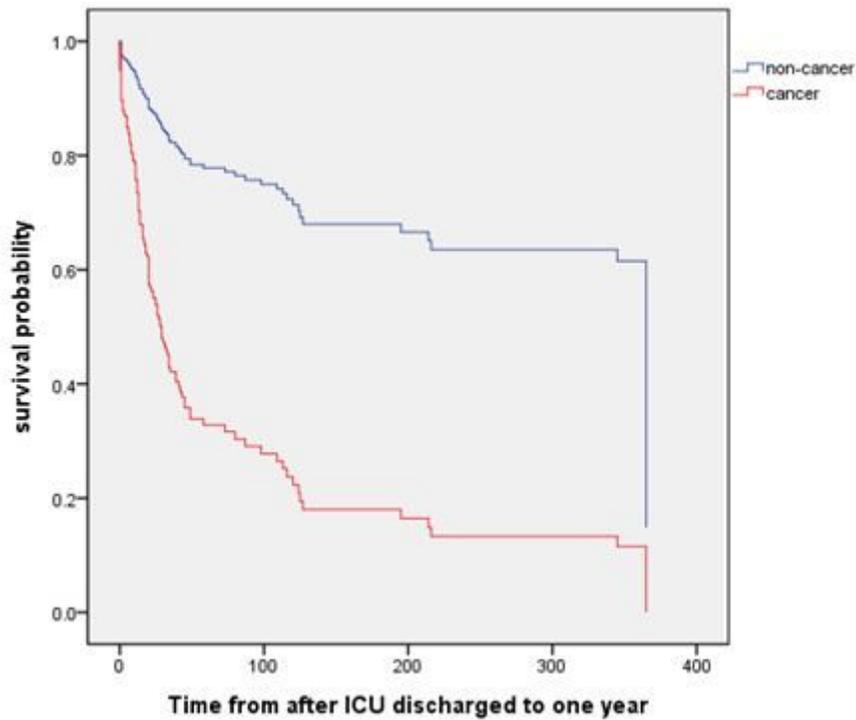


Figure 2

One-year survival rates after ICU discharge between cancer and non-cancer groups

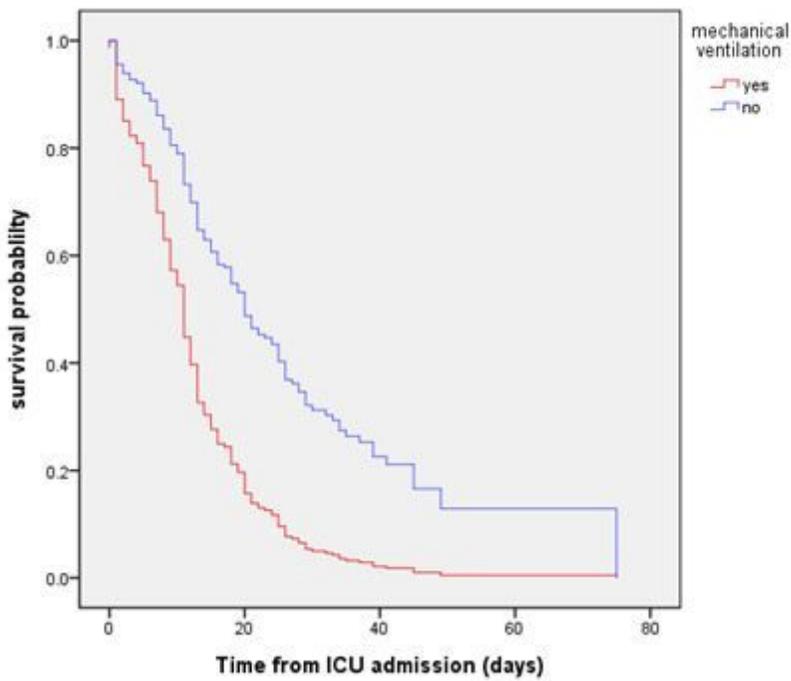


Figure 3

Impact of mechanical ventilation on ICU survival rates in cancer patients

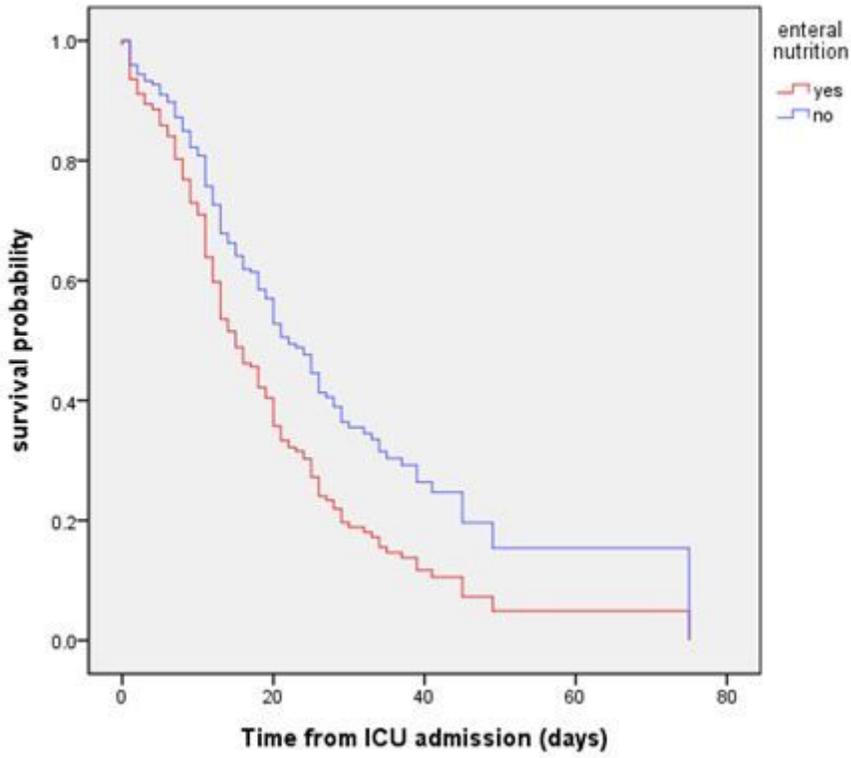


Figure 4

Impact of enteral nutrition on ICU survival rates in cancer patients

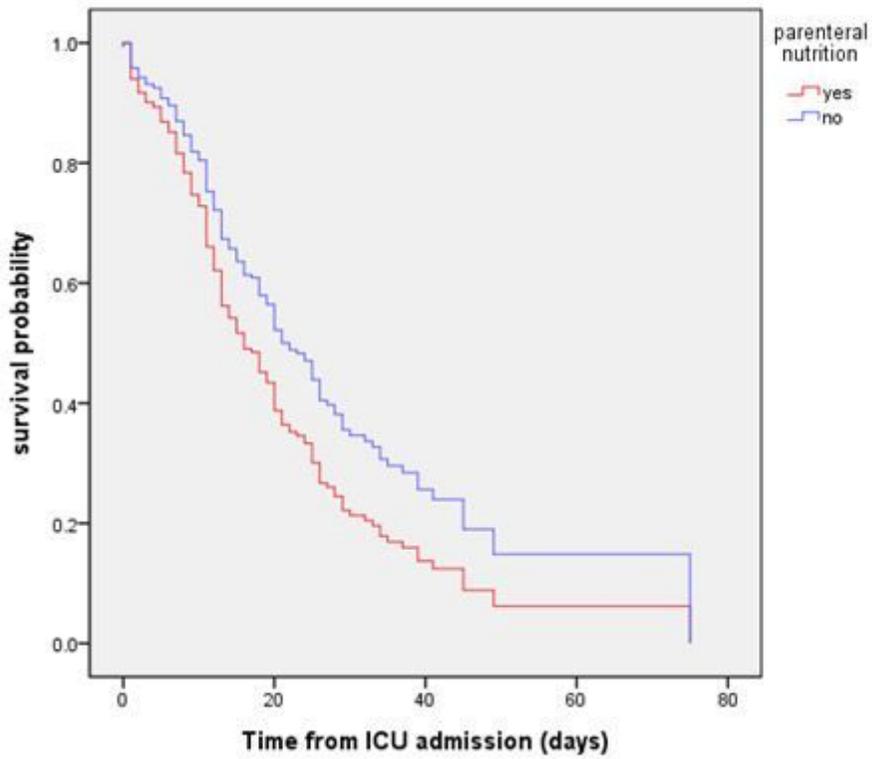


Figure 5

Impact of parenteral nutrition on ICU survival rates in cancer patients

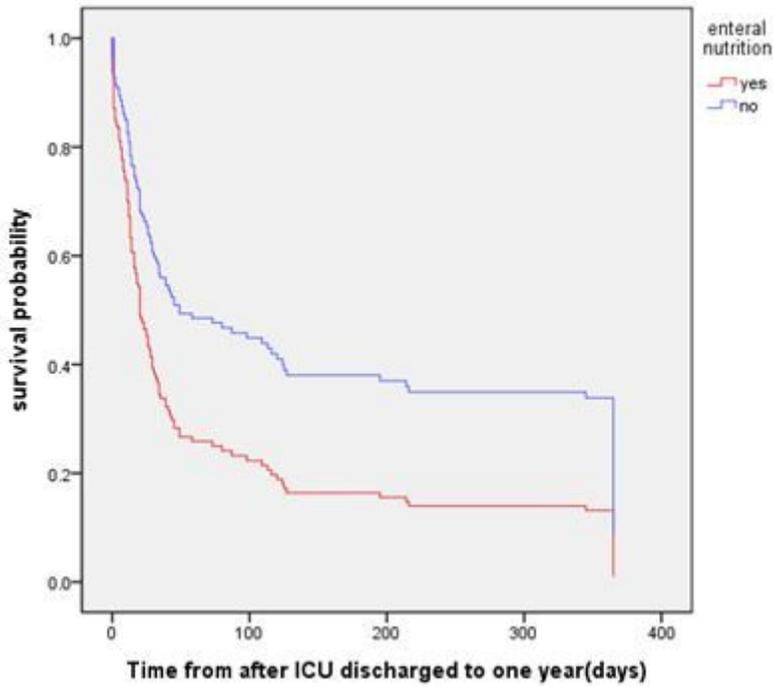


Figure 6

Impact of enteral nutrition on one-year survival rates in cancer patients

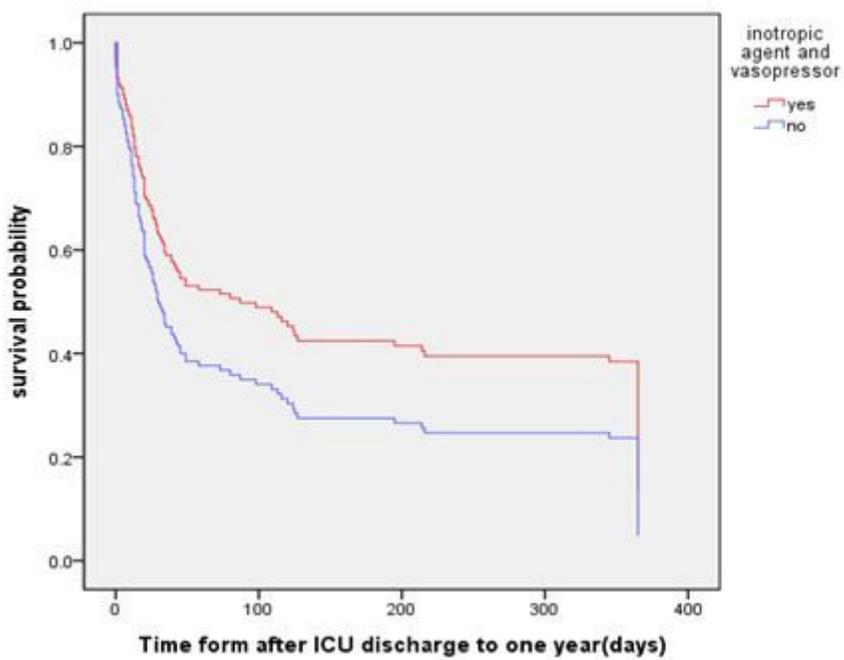


Figure 7

Impact of inotropic agent and vasopressor on one-year survival rates in cancer patients