

Escalation of Oncologic Services at the End of Life Among Patients With Gynecologic Cancer at an Urban, Public Hospital

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Abstract

Purpose: Use of oncology-related services is increasingly scrutinized, yet precisely which services are actually rendered to patients, particularly at the end of life, is unknown. This study characterizes the end-of-life use of medical services by patients with gynecologic cancer at a safety-net hospital.

Methods: Oncologic history and metrics of medical use (eg, hospitalizations, chemotherapy infusions, procedures) for patients with gynecologic oncology who died between December 2006 and February 2012 were evaluated. Mixed-effect regression models were used to test time effects and construct usage summaries.

Results: Among 116 subjects, cervical cancer accounted for the most deaths (42%). The median age at diagnosis was 55 years; 63% were Hispanic, and 65% had advanced disease. Only 34% died in hospice care. The median times from do not

resuscitate/do not intubate documentation and from last therapeutic intervention to death were 9 days and 55 days, respectively. Significant time effects for all services (eg, hospitalizations, diagnostics, procedures, treatments, clinic appointments) were detected during the patient's final year ($P < .001$), with the most dramatic changes occurring during the last 2 months. Patients with longer duration of continuity of care used significantly fewer resources toward the end of life.

Conclusion: To our knowledge, this is the first report enumerating medical services obtained by patients with gynecologic cancer in a large, public hospital during the end of life. Marked changes in interventions in the patient's final 2 months highlight the need for cost-effective, evidence-based metrics for delivering cancer care. Our data emphasize continuity of care as a significant determinant of oncologic resource use during this critical period.

Introduction

Gynecologic malignancies remain a significant cause of morbidity and mortality in the United States. In 2014, uterine cancer is expected to be the fourth most commonly diagnosed cancer.¹ Ovarian cancer was the fifth most common cause of cancer-related death among women, and one of the most expensive to treat.²

The cancer care costs in the United States are estimated to exceed \$173 billion in 2020.³ However, the clinical benefit of this expense, largely due to novel therapies and technologies, remains hotly debated. Moreover, many contend that oncologists need to more critically scrutinize their own attitudes and practices about prescribing expensive therapies for patients with poor performance status, offering palliative care sooner, and becoming more aware of the impact of provider recommendations on the sustainability of the health care system as a whole.³

In 2008, Earle et al⁴ examined cancer care providers' attitudes and practice patterns of end-of-life care for Medicare beneficiaries in the SEER-Medicare database. They identified regional differences in cancer care, with patients residing in urban areas with a greater density of oncologists being more likely to receive chemotherapy within 2 weeks of death, and to be referred to hospice within 3 days of death.

The intensity and cost of medical interventions are equally important components of end-of-life care. Morden et al⁵ found costly, yet highly varied medical resource use in the last weeks of life unexplainable by facility characteristics among fee-for-service Medicare beneficiaries in the last 6 months of life in the Medicare Denominator files for 2003 to 2007. Unsurprisingly, Chastek et al⁶ found a sharp increase in inpatient costs 6 months before death among patients with terminal cancer from a commercial insurance database. Among patients with ovarian cancer, Lewin et al⁷ identified significant differences in cost and the use of resources between patients enrolled in hospice and those who were not, yet no improvement in overall survival.

Most existing data on end-of-life health care use come from the Medicare database, which examines a select insured group of older patients. Scant data are available that specifically examine marginalized populations with less health care access and a dependence on public services. Moreover, even less information has been published on the unique subset of gynecologic oncology patients. Unlike oncologists who specialize in specific treatment modalities (ie, surgery, chemotherapy), gynecologic oncologists deliver care that spans the continuum from diagnosis through surgery, chemotherapy, and the end of life. Implications of this more centralized care model warrant analysis.

Therefore, we sought to characterize the use of health care services by patients with gynecologic cancer at an urban safety-net hospital during their last year of life, and investigate whether continuity of care in the fragmented public health system affected resource use.

Methods

Study Design

After institutional review board approval, we retrospectively reviewed medical and hospital records to systematically identify all registrants to our hospital-based gynecologic oncology clinic with documented deaths between December 2006 and February 2012. The clinic is part of a 600-bed, publicly funded teaching hospital that serves a mid to low socioeconomic status population within a major metropolitan area. The core population serviced by this institution is 71% Hispanic, 7% white/non-Hispanic, 8% black, and 11% Asian.⁸ Eighty-three percent and 80.1% of the outpatient and inpatient population, respectively, were county indigent or state funded, with only 4.9% and 6.1%, respectively, funded by Medicare.⁸

Data Collection

Clinicopathologic and oncologic history, including International Federation of Gynecology and Obstetrics (FIGO) stage, were obtained from medical records. Indices used to characterize and quantify the use of medical resources focused on the following measures: number of invasive procedures (IP), blood draws (BD), radiology studies (RAD), chemotherapy infusions (CHEMO), outpatient visits (OPV), and days of hospitalization (HD). Vital status, including the date of death, was confirmed by direct communication with next of kin by clinical nurses as part of standard institutional practices and recorded in the patient's record.

IP included surgeries requiring anesthesia (eg, laparotomy, colostomy, bowel bypass, and gastric tube placement), paracentesis, thoracentesis, arterial line placement, central line placement, endoscopy, interventional radiology procedures (eg, inferior vena cava filter placement, image-guided biopsy, percutaneous nephrostomy, and gastric tube insertion), radiotherapy, and pelvic examinations with tissue sampling. BD represented the number of times patients received a venipuncture. RAD included ultrasounds, computed tomography scans, magnetic resonance imaging, x-rays, and positron emission tomography scans. CHEMO represented the number of times patients presented to the infusion center and received chemotherapy, not necessarily the specific number of agents received (eg, doublet- or triplet-regimen). OPV recorded the number of times patients came to the gynecologic oncology clinic or the emergency room but did not require inpatient hospitalization. HD enumerated the patient's length of stay in the acute care setting, including the intensive care unit and the medical or surgical wards.

Monthly usages of medical resources as defined above were collected for each patient's last 12 months of life. For patients who were under our care for less than 12 months before their

date of death, data between their date of first encounter and date of death were included in the analyses. A month was defined as every 30 days counting backward from date of death. Length of continuous care was also examined as a continuous variable, to evaluate its effect on resource use.

Statistical Analyses

Mixed-effect linear regression models were used to examine whether there was a significant time effect in the use of medical resources across the last 12 months of the patients' lives, with patients considered as random effects in the models. The same method was also used to evaluate whether there was an association between the use of medical resources and the duration of continuous care. Modeling the changes in the measurements revealed them to be of second order for time measured in months, and so a quadratic term for time was included in the regression models. All *P* values reported were two-sided, with statistical significance defined as *P* < .05. To account for any acutely variable use of health care services upon late presentation into the health care system, additional sensitivity analyses were performed excluding the first 2 months of registering into this health care system. Data were analyzed with STATA version 9.0 (StataCorp LP, College Station, TX).

Results

One-hundred-sixteen deceased patients were identified for inclusion in the analyses. Table 1 summarizes the cohort characteristics. The median age at diagnosis was 55 years, and the median age of death was 57 years. The majority of our population was Hispanic (63%).

The median times from diagnosis to death and from initial clinic encounter to death were similar (1.5 years *v* 1.4 years, respectively, *P* = ns), indicating that the gynecologic oncology clinic serving as the primary cancer care provider for these patients.

Most patients (66%) presented with stage III or IV disease. Patients who presented with markedly advanced stage disease and/or were too medically compromised to undergo formal staging were classified as unstaged/unknown (*n* = 12; 10%). Cervical cancer comprised the largest proportion of cancers seen (*n* = 49; 42%), although all tumor types were observed.

Data on the location of death were available for > 90% of patients; 34% of patients died under the care of a hospice agency (home or in-patient hospice), 27% in the hospital, 19% at home without hospice services, and 11% at a skilled nursing facility.

When we calculated the days between do-not-resuscitate and do-not-intubate (DNR/DNI) documentation and death, 66 (57%) of these patients with gynecologic cancer had no documentation of their DNR/DNI status in the medical record. Of those who did, most of them had this discussion and status determination recorded in the last 2 weeks of life, with a median of 9 days (range, 0 to 410 days) before the date of death.

We also calculated the days between last therapeutic intervention (surgery, radiation or chemotherapy) and death. Thirty-five (30%) patients received a therapeutic intervention

Table 1. Patient and Disease Characteristics

Characteristic	No.	%
Age at diagnosis, years		
Median	55	
Range	27-85	
< 50	38	33
≥ 50	78	67
Race/ethnicity		
Hispanic	73	63
White	16	14
Asian	14	12
Black	13	11
Primary language		
Spanish	70	60
English	30	26
Other/unknown	16	14
Stage at diagnosis		
I, II	28	24
III, IV	76	66
Unstaged/unknown	12	10
Tumor site		
Uterus	34	29
Cervix	49	42
Ovary/peritoneal	25	22
Other	8	7
Place of death		
Hospice	39	34
Hospital	31	27
Home	22	19
Skilled nursing facility	14	11
Unknown	10	9
Time, diagnosis to death, years		
Median	1.5	
95% CI	0.1 to 20.8	
Time, first encounter to death, years		
Median	1.4	
95% CI	0.1 to 15.7	

within the last 1 month of life, and 37 (32%) patients underwent what was deemed a therapeutic intervention within the last 3 months of life. The median time between a patient's last therapeutic intervention and death was 55 days. Median time between last chemotherapy infusion and death was 76 days (range, 4 to 363 days). Although nine (8%) patients received no treatment during their last 12 months of life, four (3.4%) patients received chemotherapy within 30 days of death, and one patient received chemotherapy within 14 days of death.

To determine whether or not patients underwent or received more diagnostic tests, interventions, and therapies simply as a result of increased availability of these services over the 6-year study period, we conducted time-trend analyses for the use of each variable within our health care use evaluation. Among the six parameters, the number of CHEMO was significantly asso-

ciated with the year of death, with an annual increase of approximately two additional CHEMO infusions per year over the 6-year study period ($P = .033$). The use of other health care services (eg, HD, OPV, BD, RAD, IP) did not change statistically over time during this study period. We then measured the use of each health care service during the last year of life and found a significant time effect in CHEMO, HD, IP, OPV, BD, and RAD, with use of each of these measures increasing significantly during the last year of a patient's life ($P < .001$; Figure 1).

Notable changes across all measures in the last 2 months of life were observed (Figure 1). In particular, the average number of inpatient HD per patient increased over the last 12 months of life. The mean HD per month rose six-fold, with the average patient in our cohort recording 6 to 7 inpatient days in the last month of life versus only 1 inpatient HD 12 calendar months prior. The most commonly recorded indications for inpatient admission in the last 2 months of life were for symptom management (eg, obstipation, fatigue) and pain control.

Consistent with an expected higher level of medical care in the hospital, commensurate increases were evident, with the mean number of laboratory tests and radiology studies rising three-fold (2.7 to 8.1) and four-fold (0.7 to 2.8), respectively. The most common diagnostic tests performed were complete blood count, metabolic panels, and diagnostic radiology studies. On the other hand, the average number of CHEMO infusions, and OPV decreased over the last 12 months of life, dropping three-fold (from 1.1 to 0.3) and 1.6-fold (from 3.1 to 2.0), respectively. This decrease in outpatient-type services is associated with the concomitant escalation of inpatient care.

To identify factors that may contribute to the observed escalation in health care use, we evaluated the duration of time in which this patient cohort was registered and receiving care at our institution. Our analysis demonstrated that the time period between the patients' first encounter and death was significantly associated with HD ($P = .010$), OPV ($P < .001$), BD ($P < .001$), RAD ($P = .003$), IP ($P = .041$), and CHEMO ($P = .015$). Patients who had been receiving continued care within the clinic for a longer period of time experienced overall fewer HD and OPV in their last months of life. Patients who had been under continuous care for a longer period by the same medical team also underwent fewer BD, RAD, and CHEMO in the last months of life. Moreover, IP rates also differed significantly based on how long the patient had been registered within the current health care system. Patients who were registered into our health care system for the shortest period of time were more likely to be admitted into the hospital at the end of life versus receive outpatient treatment and care. Figure 2 illustrates this data by dichotomizing the duration of care into patients who had been monitored < 1 year and patients who had been monitored ≥ 1 year.

The sensitivity analysis, which uniformly excluded the patients' initial 2 months of data when there might be acutely high levels of activity due to simply being a new patient, revealed significant differences in the use of OPV ($P = .002$), BD ($P = .026$), and CHEMO ($P = .026$) between patients who had

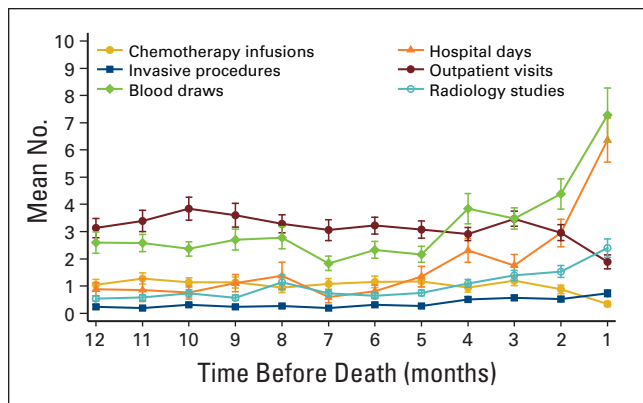


Figure 1. Health care use varies considerably in the last 12 months of life. The number of blood draws, inpatient hospital days, radiology studies, and invasive procedures increased over time, whereas the number of outpatient visits and chemotherapy infusions decreased. All P values $< .001$ (mixed effect regression models).

been receiving continuous medical care in our health care system for a longer period of time compared with patients in our health care system for a shorter period of time.

Lastly, there was no significant association between health care use and the patient's age at diagnosis, race/ethnicity, primary language, FIGO stage, and tumor site. However, the patient's age at the time of death was significantly associated with the number of chemotherapy infusions ($P = .025$), with older patients receiving fewer infusions than younger patients.

Discussion

Our analyses depict dramatic changes in the use of diagnostic and treatment interventions at the end of life, provide insight into where health care services are being directed currently, and suggest where future resources may be targeted. In particular, our study illuminates the complex terminal situation of a sample of patients of lower socioeconomic status, with advanced gynecologic malignancies, served by an urban, government-run medical center.

Importantly, our data showed that lengthier time in the same health care system, with coordination and oversight of care by a stable medical team, may favorably affect the efficiency of resource use in the inpatient and outpatient settings. Although Burge et al showed that high primary care continuity was significantly associated with out-of-hospital place of death⁹ and decreased emergency department¹⁰ for patients with advanced cancer in Canada, whether these observations will be seen in the United States health care economy is unclear, yet doubtful. Some reports from the linked SEER-Medicare database suggest that for patients with lung cancer, continuity of care, defined as an inpatient visit by the patient's usual provider during a terminal hospitalization, reduced the odds of intensive care unit stay by 25%; however, the authors appropriately acknowledge the inherent limitations of using an administrative database to try to capture nuances among local health care systems that may likely affect use of health care resources.¹¹ Our work directly acknowledges and addresses the variability in health care systems by sharply focusing on use within this large

government-run safety-net medical system that serves four state counties north of the US-Mexico border. We show that particularly for patients with gynecologic cancer with terminal disease, having a longer continuous relationship with a specific group of providers, remarkably affected the number of outpatient visits, laboratory tests, and chemotherapy infusions, and influenced the amount of inpatient hospital days, radiology studies, and invasive procedures.

Secondly, we uncovered, that while establishing resuscitation/code status earlier rather than later in the oncology disease continuum is gaining acceptance, little data exist to guide the optimal timing for this discussion and how it would best fit into a model of comprehensive cancer care. ASCO strongly suggests early integration of palliative care services to facilitate these discussions, especially for patients in advanced stages of cancer.¹² Studies substantiate that enrollment in palliative care services or hospice does not negatively affect overall survival¹³⁻¹⁵ but may curb costly ICU and emergency department usage, avoid futile interventions, and even improve the quality of life for patients and caregivers.¹⁶⁻¹⁸ Despite improvements in end-of-life planning and growing endorsement of hospice care over the past decade, multiple reports still show that such decisions continue to be delayed to within moments of death.¹⁹⁻²¹ What drives this procrastination, whether appropriate or not, warrants further investigation.

With the advent of the Patient Protection and Affordable Care Act in 2010, health care coverage and financing are expected to change dramatically in upcoming years, particularly for government safety-net institutions with largely uninsured or marginally insured patients, such as the one in this report. Therefore, establishing a baseline level of use with quantifiable metrics is imperative in order to detect changes in service use and expenditures, and generate recommendations for resource allocation. More attention will be placed on linking payment and spending with quality outcomes. Actual cost data on the health services examined here may help to develop a more nuanced model of composite resource use. Comparing use by patients at a public-payer institution with that by patients at a private-payer institution in the same catchment area would further inform how the structure and navigation of cancer care can be improved as a whole.

This exploratory study of an important public health problem in oncology is limited by its retrospective design, such as dependence on medical records and potential variability in reporting end-of-life discussions and code status decisions. Although our analyses could only be based on information within our institution, and could not capture data if the patients went elsewhere for care, given the nature of our safety-net institution, obtaining care elsewhere is unlikely for this cohort of patients.

The unique ethnic and economic composition of our study population may pose a selection bias, thus limiting the external validity of our findings to a broader population. Future validation studies measuring parameters of health care use in other urban public health care networks would be key to better understanding the unique cultural and health care needs of this patient population in order to design more appropriate and

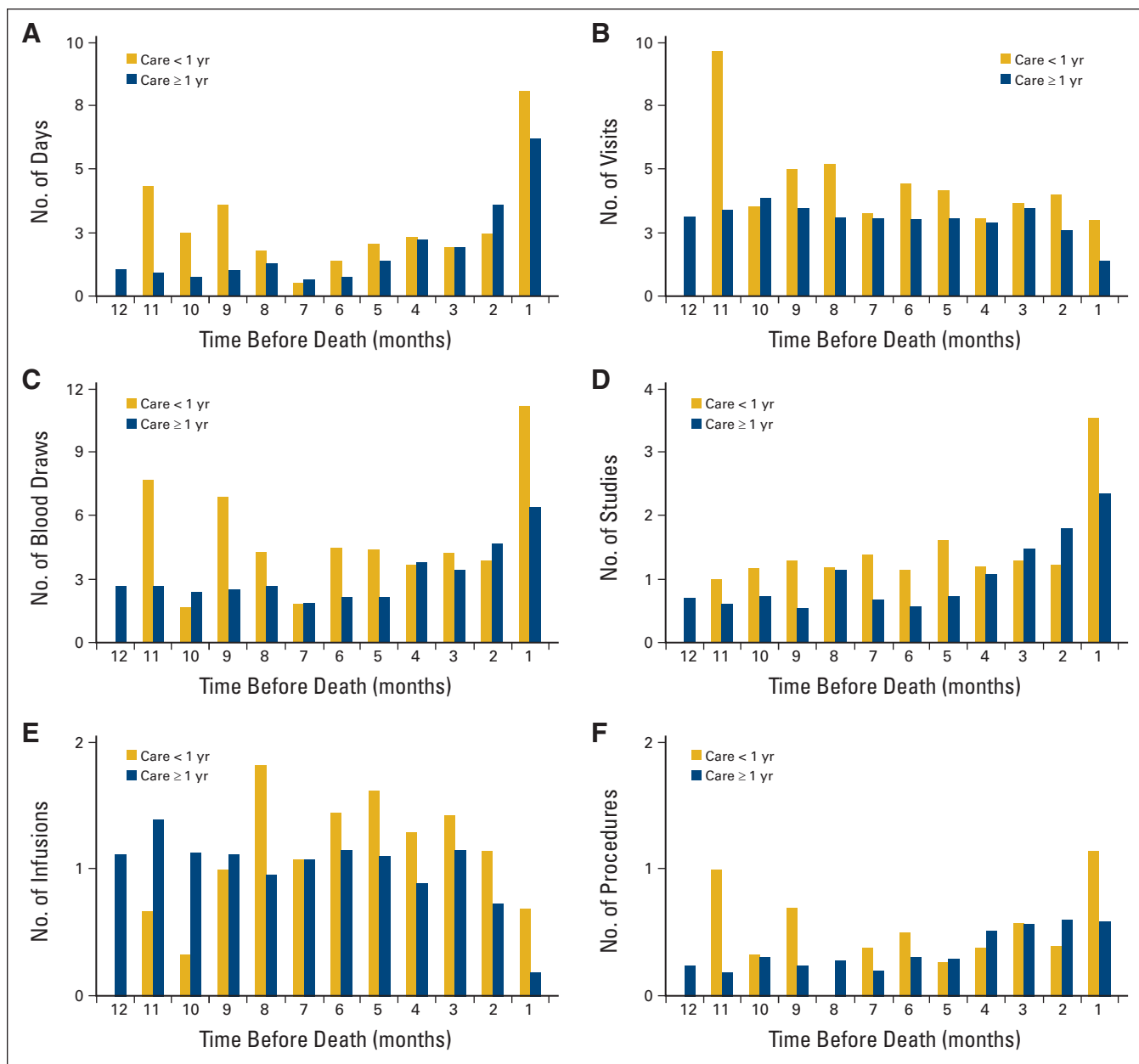


Figure 2. The duration of time between first encounter and death is significantly associated with resource use, as shown for No. of (A) hospital days, (B) outpatient visits, (C) blood draws, (D), radiology studies, (E) chemotherapy infusions, and (F) invasive procedures. Patients registered for care in the current health care system for a longer period of time exhibited less intense use of resources towards the end of life, compared to late registrants to care. For illustration purposes, differences in resource use for each parameter studied are depicted after stratifying patients into those registered to care for < 1 year, and those registered for ≥ 1 year.

comprehensive cancer care services. Parallel studies in other health care systems (eg, HMO systems, etc so on) will provide valuable comparative data to guide appropriate end-of-life care for patients with cancer. Data compilation from additional patient cohorts may enable simultaneous analysis of multiple end points and further validate these preliminary findings.

Health care delivery for women with gynecologic malignancies represents the unique model of cancer care endorsed by the Society of Gynecologic Oncology (sgo.org) whereby currently fragmented care should be replaced by multidisciplinary caregivers centered around a gynecologic oncologist who would be

the focal point (“team captain”) for the patient. Although implementation challenges for this model within a diverse payer and record-keeping climate exist, this initial analysis of existing resources can lay the groundwork for such system building.

In conclusion, to our knowledge, this is the first report quantifying end-of-life health care use by patients with gynecologic cancer in a large, public hospital. Our findings yielded thought-provoking perspectives and questions, broadly applicable to patients with cancer. Marked changes in interventions in the patients’ final 2 months emphasize the necessity for evidence-based metrics for delivering cancer care. Our data highlight the

need for further research into continuity of care as a determinant of resource use. Lastly, early involvement of palliative care teams may be a key component in ongoing efforts to provide cost-effective, quality care at this critical juncture.

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Authors' Disclosures of Potential Conflicts of Interest

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AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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