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# Palliative Care Training and Decision-Making for Patients with Advanced Cancer: A Comparison of Surgeons and Medical Physicians

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## Abstract

**Background—**Surgical decision-making in patients with advanced cancer requires careful thought and deliberation to balance the high risks with the potential palliative benefits. We sought to compare surgical decision-making and palliative care training among surgeons and medical physicians who commonly treat advanced cancer patients. We hypothesized that surgeons will report less palliative care training compared to medical physicians, and deficits in palliative care training will be associated with more aggressive treatment recommendations in clinical scenarios of advanced cancer patients with symptomatic surgical conditions.

**Study Design—**Practicing surgeons, medical oncologists, intensivists, and palliative care physicians from a large urban city and its surrounding areas were surveyed with a 32-item questionnaire consisting of a survey addressing palliative care training and 4 clinical vignettes depicting patients with advanced cancer and symptomatic surgical conditions.

**Results—**Of the 299 physicians surveyed, 102 responded (response rate 34.1%). Surgeons reported fewer hours of palliative care training during residency, fellowship, and continuing medical education combined (median 10, IQR 2–15) compared to medical oncologists (median 30, IQR 20–80) and medical intensivists (median 50 IQR 30–100), $p<0.05$. Additionally, 20% of surgeons reported no history of any palliative care training. Analysis of physician recommendations for treatment of the 4 clinical vignettes showed minimal consensus regardless of physician specialty. Absence of palliative care training was associated with recommending major

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operative intervention more frequently compared to physicians with ≥40 hours of palliative care training (0.7 ± 0.7 vs. 1.6 ± 0.8, p=0.01).

**Conclusion—**Substantial deficiencies in palliative care training persist among surgeons and are associated with more aggressive recommendations for treatment for the selected scenarios presented in patients with advanced cancer patients. These findings highlight the need for greater efforts system-wide in palliative care education among surgeons including incorporation of a structured palliative care training curriculum in graduate and continuing surgical education.

## TOC Statement

In a survey of surgeons & medical physicians, we found palliative care training deficits among surgeons impacting care recommendations for cancer patients. The significance of this is we identified vital systemic changes needed in surgical training.

### Keywords

palliative care; palliative surgery; palliative care training; surveys and questionnaires; cancer; advanced malignancy

## Introduction

With more than 1.6 million new cancer diagnoses in 2017, cancer is a leading cause of mortality in the United States.(1, 2) Despite advances in cancer treatments, distant, metastatic, unresectable disease remains common, with rates as great as 60% at the time of diagnosis for lung, ovarian, and pancreatic cancers.(1) This scenario is particularly concerning, because patients with such diagnoses of advanced cancer commonly present with debilitating surgical conditions such as malignant bowel obstruction.(3, 4) Surgical decision-making for patients with advanced cancer can be extremely complex.(5) Previous research has shown that operative intervention in patients with stage IV cancer is associated with greater risks of serious complications, prolonged hospitalizations, hospital readmissions, and death compared to patients without this diagnosis.(6) Surgeons, therefore, must weigh the surgical risks with the potential palliative benefits, knowing that operative complications may impact patients' quality of life profoundly.(3, 6, 7)Training in palliative care (i.e. patient care focused on improving quality of life by relieving symptoms and addressing physical and psychosocial problems), is essential for surgeons and all physicians caring for patients with advanced cancer.(8)

Surgical training in palliative care has been limited historically despite the high frequency of surgical consults for terminally ill patients and the complicated nature of the surgical decision-making for these at-risk patients.(9, 10) In 2005, we first reported that greater than 80% of surveyed surgeons never received any palliative care training during residency or fellowship.(11) Additionally, our findings suggested that this lack of palliative care training contributed to an overall lack of consensus among surgeons for the appropriate treatment in multiple clinical scenarios depicting symptomatic surgical conditions in patient with advanced cancer. Over the past 15 years, there has been a greater acknowledgement of deficits in the training of surgeons in palliative care .(9–11) The American College of

Surgeons (ACS) created the Committee on Surgical Palliative Care with the goal of incorporating training, research, and advocacy in palliative care into surgical practice.(9) This approach has led to advances in palliative care training for physicians by including the development of structured, empirically validated courses, such as the Education for Physicians on End-of-life Care (EPEC) curriculum, the inclusion of palliative care lectures and didactics at national society conferences including the ACS, Society of Surgical Oncology (SSO), and the American Society of Clinical Oncologists (ASCO), and the promotion of resources in self-directed learning, including the palliative care series in the Journal of the American College of Surgeons the'Surgical Palliative Care: A Resident's Guide.' Developed by the ACS(12–14) Despite such efforts, there continues to be concerns about the lack of appropriate training in palliative care among surgeons.(10, 15)

Patients with advanced cancer are often treated by multidisciplinary teams composed of physicians with diverse specialty training, including surgeons, medical oncologists, intensivists, and palliative care physicians. There is little current insight into comparing palliative care training among medical and surgical physician specialties. Additionally, it is unclear how palliative care training impacts a physician's treatment decision-making. Therefore, the objectives of the present study were: (1) to compare the training received in palliative care among surgeons and medical physicians who commonly care for patients with advanced cancer, (2) to compare decision-making in clinical scenarios describing symptomatic surgical conditions in patients with advanced cancer between surgeons and medical physicians, and (3) to evaluate the impact of palliative care training on decision-making in selected clinical scenarios depicting patients with advanced cancer. Our hypothesiis was that surgeons will have experienced less training in palliative care than medical physicians and that greater palliative care training will be associated with less interventional preferrences for invasive treatment in these selected clinical scenarios of patients with advanced cancer who have symptomatic conditions potentially requiring operative intervention..

## Methods

The research protocol was reviewed by the University of California (UC), Davis Institutional Review Board and was determined to be exempt. Currently practicing attending surgeons, medical oncologists, pulmonary critical care physicians, and palliative care physicians in the Sacramento, California and surrounding areas were surveyed from February 6$^{th}$, 2017 to April 6$^{th}$, 2017. Physicians were identified from hospital rosters from the four medical groups practicing at 12 Sacramento area hospitals. Of note, all hospitals utilize a multidisciplinary, team approach in their delivery of cancer care, which consists of medical, radiation, and surgical oncologists in addition to ancillary staff (nursing, social workers, etc), but only the UC Davis Comprehensive Cancer Center (affiliated with the UC Davis Medical Center) is a designated National Cancer Institute (NCI) comprehensive cancer center. We excluded resident and fellow trainees and select surgical subspecialties, including vascular, cardiac, pediatric, plastic, and urologic subspecialties. In total, 308 physicians were identified consisting of 142 surgeons, 76 medical oncologists, 76 pulmonary critical care physicians and 14 palliative care physicians. Nine of the 308 physicians had undeliverable

addresses including five surgeons, two medical oncologists, and two palliative care physicians leaving a final cohort of 299 physicians.

We employed physical and electronic mail to improve survey response rates.(16) All physicians were first mailed a cover letter with the survey questionnaire, which explained the purpose of this study and assurances of the anonymity of their responses. Each respondent was provided with a prepaid, self-addressed envelope to return the questionnaire. Subsequently, we emailed the all physicians with available hospital-affiliated email addresses (n=222, 74.3%) two weeks after the initial surveys were sent with a modified cover letter and URL link to an online version of the survey. Physicians were instructed to only complete the online survey if they had not already completed and returned the previously mailed version. A second and final email was sent t10 days after this initial email requesting completion of the questionnaire by URL link or mail if not completed previously. We completed collection of survey responses after 8 weeks from the initial mailing.

## Questionnaire

The 32-item questionnaire (see supplementary material) consisted of a section on demographic and palliative care training and four clinical vignettes created previously by Galante et. al. based on prior literature on palliative surgery and published case scenarios. (11, 17, 18) Because the original questionnaire was designed and implemented in 2004 by the UC Davis Medical Center surgical oncology group,(11) we updated the original potential responses to the vignette to reflect advances in medical technology and treatment guidelines, including the addition of 'procedural intervention' as a potential treatment option. The survey was estimated to take 10–15 minutes to complete. We purposely omitted information with respect to living wills or patient and family preferences to allow respondents to identifyn management preferences of the physician without potential confounding.

To evaluate clinical decision-making othe participant, respondents were presented with four clinical vignettes describing scenarios involving patients with stage IV cancer presenting common surgical conditions varying in prognosis and acuity. These clinical scenarios are described in Tables 1–4. The first vignette depicts a patient with malignant bowel obstruction. The second vignette describes a patient with stage IV lung cancer and recurrent gastrointestinal bleeding . The third vignette depicts a patient with stage IV breast cancer in critical condition with lung entrapment after a motor vehicle collision. The final vignette describes a patient with stage IV prostate cancer and a symptomatic inguinal hernia.

After each clinical scenario, respondents were asked to perform the following four tasks: (1) select one treatment recommendation, (2) rank the goal of the recommended intervention from most to least important, (3) select three important factors influencing their selection of the recommended intervention, and (4) select a provider they identified as most responsible for initiating the discussion of the goals of end-of-life care with the patient and/or family. The options provided to participants to select from for each task are listed in Tables 1–4. After completing the clinical vignettes, participants were asked to rate on a 7-point Likert scale how comfortable they felt making the previous treatment recommendations and to complete a questionnaire on demographics and palliative care training.

Palliative care training was defined as participation in courses, lectures, simulated patient care, palliative care fellowships, and self-directed learning, including journal articles, books, and on-line courses. Self-directed learning was included in our definition, because numerous resources have been developed to address deficits in palliative care training among physicians in the form of journal articles, books, and online courses, including the palliative care series in the Journal of the American College of Surgeons and the ‘ palliative care guide for residents de veloped by the ACS.(10, 12, 13) Hours of palliative care training was estimated based on physician self-report.

### Statistical Analysis

Descriptive data were presented as medians with interquartile ranges (IQRs) and percentages unless otherwise documented. As appropriate, Chi square or Fisher’s exact test were used to compare survey responses between surgeons and medical physicians (medical oncologists, pulmonary critical care physicians, and palliative care physicians). Analysis of variance or nonparametric testing as appropriate was performed to assess years in practice, hours of palliative care training, number of consults, and decision-making comfort between groups.

To address the implications of nonresponse bias in this study, we performed an analysis of demographic differences between survey responders and non-responders. Because university-practice physicians responded more frequently compared to community-practice physicians, using the Fisher’s exact and the Kruskal-Wallis tests, respectively, we compared the reponses to the clinical vignettes and hours of palliative care training based on practice setting to determine how this difference may have influenced our findings. Significance was set at $p<0.05$. All data analyses were performed using Statistical Analysis Software (SAS) version 9.4.

## Results

### Response Rates and Characteristics of the Respondents

Of the 299 surveyed physicians, 102 responded to our survey by mail (n=61, 59.8%) and electronically (n=41, 40.2%) with an overall response rate of 34.1%. Response rates by specialty were as follows: 40.1% of surgeons (n=55), 24% of medical oncologists (n=18), 17% of pulmonary critical care physicians (n=13), and 58% of palliative care physicians (n=7). Nine physicians failed to report their specialty.

Table 5 compares respondent demographics to all Sacramento area physicians surveyed. Respondents’ median age was 47 years (IQR 41–58) and most were male (82.8%). The median years practicing since completion of graduate medical education (GME) was 14 years (IQR 5–22). Although 70.6% of the physicians surveyed practiced in a community hospital setting, only 46.7% of respondents reported practicing in a community setting.

The median number of monthly consults for terminally ill patients was 2.5 (IQR 1.0–8.0) with significant differences by specialty ($p<0.0001$). Surgeons reported the fewest (1.5, IQR 0.5–2.5), followed by medical oncologists (5.5, IQR 3.0–10.0) and pulmonary critical care physicians (10.0, IQR 1.8–10.0). Surgeons with specialty training reported more frequent monthly consults compare to surgeons without specialty training (1.8, IQR 1–3 vs. 1.0, IQR

0.5–1, p=0.03). Palliative care physicians reported the most monthly consults (25.0, IQR 10.0–50.0).

## Palliative Care Training

As illustrated in Figure 1, surgeons reported significantly less hours of palliative care training compared to medical oncologists and pulmonary critical care physicians during fellowship and in total ($p<0.05$). The median number of hours of palliative care training among surgeons during residency and fellowship was 0.0 (residency IQR 0.0–3.5, fellowship IQR 0.0–2.0), through continuing medical education (CME) was 5.0 (IQR 0.0–12.0), and in total was 10.0 (IQR 2.0–15.0). Ten surgeons (20%) reported no history of any palliative care training. In contrast, the median number of hours of palliative care training among medical oncologists was 0.0 (IQR 0.0–5.0) during residency, 20.0 (IQR 10.0–40.0) during fellowship, 10.0 (IQR 4.0–30.0) through CME, and 30.0 (IQR 20.0–80.0) in total and among pulmonary critical care physicians was 9.0 (IQR 0.0–19.0) during residency, 10.0 (IQR 0.0–30.0) during fellowship, 25.0 (IQR 0.0–57.0) through CME, and 50.0 (IQR 30.0–100.0) in total. All medical oncologists reported some palliative care training and only one pulmonary critical care physician reported no history of palliative care training . There were no differences in total palliative care training based on practice setting or years in clinical practice ($p>0.05$), but, physicians in practice for ≥14 years reported less hours of palliative care training in residency compared to physicians in practice for <14 years (0 IQR 0–2 vs. 5 IQR 0–10, p=0.001).

There were no differences in the form of palliative care training between surgeons and medical physicians ($p>0.05$ all). Most had received lectures on palliative care (n=49, 64%). Other sources included reviewing journal articles (n=30, 39%), courses (n=25, 33%), and simulated patient care experiences (n=11, 14%).

## Decision-making for Clinical Vignettes

For the first clinical scenario (i.e. malignant bowel obstruction), there were no differences in treatment recommendations between surgeons and medical physicians (Table 1, p=0.48). Although not a majority consensus, the most common response among all physicians was nonoperative management with operative intervention only if the patient failed to improve (44.1%). The majority selected symptom relief as the most important goal of the selected intervention (90.1%). Functional status (57.8%) and potential for pain/symptom relief (62.8%) were the most important factors influencing treatment recommendations.

In the second clinical vignette (i.e. gastrointestinal bleed in the setting of metastatic lung cancer), most medical physicians recommended a minor procedure ( transcatheter embolization-; 56%), whereas, there was no majority consensus among surgeons (Table 2; p=0.0002). Additionally, surgeons were the only physicians to recommend major operative intervention (29%). Despite these differences, most respondents reported symptom relief as the most important goal of the intervention (52.5%). Functional status (58.6%), expected survival time (55.6%), and potential for pain/symptom relief (51.5%) were the most important factors impacting treatment recommendations; medical physicians selected expected survival time (72%) more frequently compared to surgeons (46%, p=0.01).

For the third clinical scenario (i.e. metastatic breast cancer in critical condition after a motor vehicle collision), there was no clear majority treatment recommendation among all respondents (Table 3). We observed a trend (p=0.09) in which medical physicians recommended hospice/withdrawal of care (41%) and surgeons recommended major or minor operative interventions (58%). There was no consensus with respect to goals of the intervention for all respondents. Expected survival time was as the most important factor influencing treatment recommendations (62.1% all physicians). Again, medical physicians selected expected survival time more frequently than surgeons (77% vs. 53%, p=0.03).

Treatment recommendations for the fourth clinical scenario (i.e. symptomatic inguinal hernia) were similar among surgeons and medical physicians with a consensus recommending operative l repair (major or minor operations83.3%; Table 4; p=0.06). Most selected relief of symptoms (61,1%) as the most important goal of the intervention with functional status (83.3%) and expected survival (60.4%) as the two most common factors that impacted treatment recommendations. Like the previous vignettes, expected survival time was selected more frequently by medical physicians (80%) compared to surgeons (46%, p=0.001).

There were no differences in decision-making concerning comfort among surgeons and medical physicians (6, 'moderately comfortable,' IQR 4–7 vs. 6, IQR 5–7, p=0.21). Additionally, there were no differences in treatment recommendations based on years in clinical practice or practice setting (p>0.05 all 4 vignettes).

We did find an association between recommendations of operative intervention and palliative care training. Physicians without palliative care training selected major operqtive intervention more frequently compared to physicians with ≥40 hours of training (1.6 ±0.8 vs. 0.7 ±0.7, p=0.01, Figure 2). When analyzing the clinical vignettes individually, for the first vignette (i.e. malignant bowel obstruction), physicians with no palliative care training selected 'major surgical intervention' more frequently compared to physicians who reported any palliative care training (36% vs. 15%), whereas physicians with palliative care training selected 'nonsurgical management' (18%) and 'nonsurgical management with surgical intervention if the patient fails to improve' (43%) more frequently than physicians without palliative care training (9% and 27 %, respectively, p=0.02). For the second vignette (i.e. gastrointestinal bleeding in the setting of metastatic lung cancer), physicians with <40 hours of palliative care training selected 'major surgical intervention' more frequently than those with ≥40 hours of training (23% vs. 4%, p=0.003). There was no difference in the third clinical vignette (e.g. metastatic breast cancer in critical condition after a motor vehicle collision), with 36% of physicians without palliative care training recommending 'major surgical intervention' compared to 30% of physicians with 1–40 hours of palliative care training and 189% of physicians with ≥40 hours of training (p=0.46). Despite these results, there were no differences in decision-making concerning comfort among physicians based on palliative care training(p>0.05, Figure 3). The median self-reported level of comfort was 6, "moderately comfortable," regardless of palliative care training (no training IQR 6–7, 1–39 hours IQR 4–6, ≥40 hours IQR 4–6).

### Selection of the Provider of End-of-life Discussion

Tables 1–4 describe physician preferences for the provider responsible for initiating an end-of-life discussion of the goals of care with the patient and/or family. In the case of malignant bowel obstruction, surgeons showed no clear provider preference, while medical physicians selected medical oncologists most frequently (n=18, 46%, p=0.02). In the second clinical vignette, there was no difference with 46% (n=18) of medical physicians selecting medical oncologists(p=0.17). Surgeons selected themselves as the responsible provider most frequently for the third and fourth clinical vignettes (n=22, 41% and n=30, 56% respectively), while medical physicians selected medical oncologists most frequently (n=12, 32% and n=18, 46%, respectively). Among respondents who selected “other” (n=45 total for all four scenarios), 42% (n=19) recommended a multidisciplinary team approach when initiating the end-of-life goals of care discussion with the patient and/or family.

## Discussion

In this survey, surgeons reported less palliative care training compared to physicians in other medical specialties. In fact, 20% of surgeons reported no history of any palliative care training in residency, fellowship, or CME. This training deficit is especially important, because we also found that physicians without palliative care training selected major operative intervention as their initial treatment recommendation more frequently than those with palliative care training. Additionally, physicians with deficits in palliative care training failed to view these deficits as potentially adversely impacting their decision-making, because most physicians reported feeling comfortable in making treatment recommendations regardless of their training. Such results have important implications; overly aggressive treatment in ptients with advanced cancer, particularly at the end of life, has received attention as an indicator of poor quality of care.(19, 20) Such results emphasize the importance of palliative care training in surgical decision-making for patients with advanced cancer and the current deficits present in GME and CME training, particularly for surgeons.

These findings are most exemplified in physician responses to the first and second clinical vignettes (i.e. malignant bowel obstruction and gastrointestinal bleeding in setting of adanced metastatic lung cancer) where deficits in palliative care training was associated with greater frequency of recommending ’major surgical intervention’ despite the availability of less aggressive treatment strategies, which are more appropriate based on current expert guidelines.(21–23) For example, radiology and gastrointestinal physician groups have recommended the initial use of interventional transcatheter arteriography including embolization in high-risk surgical patients such as those with a diagnosis of advanced metastatic cancer with upper gastrointestinal bleeding not amenable to endoscopic intervention. Additionally, in the case of malignant bowel obstruction, widespread carcinomatosis and ascites has been cited as a predictor of poor surgical outcomes, which has led to expert consensus guidelines recommending the utilization of medical interventions in the such patients (in the absence of bowel ischemia or perforation) including antiemetics, steroids, analgesics, and gastric decompression followed by repeated symptom re-evaluation and treatment modification with the goal of providing optimal symptomatic relief.(21, 24, 25) Because malignant bowel obstruction is exceedingly common with an

incidence as great as 28–51% for gastrointestinal and gynecologic cancers, it is critical that treating physicians, which often involves general surgeons, have adequate palliative care training to engage in evidence-based discussions with patients and families on patient prognosis, including expected survival and the available treatment options including the risks and benefits with invasive approaches.(4, 26)

Unfortunately, combined with our previous study(11), these results suggest a lack of progress in surgical education incorporating much needed palliative care training despite recent efforts by specialty societies.(9) More than a decade prior, our group reported comparable results among surgeons.(11) We found limited consensus in clinical decision-making and corresponding deficits in palliative care training, suggesting a mechanistic link. This observation is further supported by a recent survey of fellows in surgical oncology and hepatobiliary surgery, in which 49% of fellows reported no palliative care exposure during fellowship.(27) Additionally, among those with exposure to palliative care, the experience was often of deemed to be of poor quality. Such results are concerning given the substantial population of patients with advanced cancer in our aging population for whom palliation and appropriate end-of-life care are an increasing priority.(10)

Furthermore, the lack of consensus in treatment recommendations further reinforces the marked complexity in surgical decision-making for these patients with advanced cancer. Appropriate training in palliative care is necessary to address knowledge and communication deficits related to end-of-life care to assist surgeons and their patients in this decision-making process. Prior research has shown that structured end-of-life education and training in communication skills increase physician self-efficacy and knowledge and improve physician-patient communication with the potential to improve patient outcomes at the end-of-life.(28, 29)

With respect to our institution, UC Davis Medical Center, given the disparity in recommendations among providers, we have changed our practice such that all patients with Stage IV disease who are either admitted to the hospital from the Emergency Department or are transferred to any intensive care unit now receive a consultation from the palliative care service. This policy facilitates inter-disciplinary discussion of the options of care with the ultimate long-term goal of a more unified approach to patients with advanced disease. In addition, a palliative care clinic has been initiated in the outpatient setting at the UC Davis Comprehensive Cancer Center as a referral source for patients. General surgery residents will rotate with the board-certified palliative care physicians in this outpatient clinic during their surgical oncology rotation as an intern, mid-level, and senior resident. Furthermore, although we provide annual lectures on palliative care to resident trainees currently , we plan to expand this training and incorporate a structured training program with brief, case-based didactic sessions for our surgical residents, similar to those described by Raoof, Pernar, and colleagues e(30, 31); they described the successful creation of structured palliative care training programs at their respective institutions specifically intended for surgery residents using preexisting, publicly available content (i.e. the Surgical Palliative Care: A Resident’s Guide’ developed by the ACS).(12) These programs were shown to be effective in increasing resident knowledge of palliative care and resident confidence in application of such principles of palliative care learned in the brief, structured training programs.

Additionally, although our survey was limited to a specific locality as discussed earlier, a recent national survey of surgical oncology and hepatobiliary fellows identified similar deficiencies in palliative care training, which suggests our findings are reflective of deficitsin surgical training nationally.(27) Although the American Board of Surgery currently requires surgeons to have knowledge of palliative care and treatment options for terminally ill patients,(32) no explicit requirement in palliative care training exists. Therefore, further efforts must be applied by the Accredited Council for Graduate Medical Education (ACGME) and national societies, including the ACS and the SSO, to address national deficit in palliative care training. With respect to GME for general surgery and surgical subspecialties, the following strategies may be applied: (1) integration of a structured palliative care training curriculum in surgical GME, (2) modification of ACGME general surgery core competencies and milestones to include knowledge in palliative care including palliative surgery, pain management, and communication of end-of-life goals of care, and (3) formal rotations in palliative care during surgical fellowships, including surgical critical care and surgical oncology. As discussed previously, structured palliative care training programs targeting general surgery residents, noted to be as brief as two hours, have been shown to improve t clinical knowledge in end-of-life care consistent with palliative care principals, as well as improve confidence in providing end-of-life care to patients and families, including initiating end-of-life discussions and discussing patient prognosis, code status, and palliative care options.(30, 31) Additionally, because current surgical ACGME core competencies and milestones have been found to be lacking with respect to palliative care,(33) the addition of specific competencies and milestones in palliative care have the potential to further ensure that surgery residents receive adequate training and are evaluated as competent in applying their training. Furthermore, because surgeons with specialty training reported almost twice the number of monthly consults for terminally ill patients and fellowship training provides opportunities for comprehensive in-depth training, formal rotations in palliative care during fellowship would provide surgical specialists, including surgical oncologists and critical care physicians, with much needed knowledge and competence in end-of-life care.

In addition to training deficiencies in GME, our findings suggest continued deficiencies in surgical CME despite emphasis from specialty societies, including the ACS and the development of palliative care training programs such as the Education for Physicians on End-of-life Care (EPEC) curriculum.(14) To their credit, national surgical societies, including the ACS and the SSO have incorporated sessions on palliative care and palliative surgery into their annual conference programs. Although these sessions may be informational, it is, however, unclear about the effectiveness of these approaches at providing adequate training and proficiency in palliative care, especially compared to empirically validated, structured training programs. Therefore, incorporation of structured palliative care training into national surgical society meetings, such as the EPEC program, may provide more comprehensive and effective palliative care training.

We acknowledge the following limitations. We surveyed physicians from a single city and surrounding area limiting the generalizability of our findings; however, we intentionally chose a large urban city, Sacramento, with the 35$^{th}$ largest population in the United States and a diverse number of hospitals, including academic and community facilities and mixture of physician practices, including individual and group private practices, hospital-based

practices, health maintenance organizations, and integrated delivery systems.(34) We contend that such hospital and physician diversity improves the generalizability of this study's findings. We do acknowledge, however, as all hospital facilities of the physicians surveyed use multidisciplinary teams for cancer care, that our findings may not be generalizable to physicians who practice in solo practice settings that do not utilize a multidisciplinary team approach to cancer treatment.

We recognize that most respondents were male. This imbalance in the sex of the respondenst is reflected in physician demographics nationally; 82% of practicing surgeons, 76% of pulmonary critical care physicians, and 70% of medical oncologists in the United States were male in 2013.(35) Therefore, this disparity in sex of these physicians appears to accurately mirror physician demographics nationally. Additional limitations include the modest overall response rate (34.1%), limiting the power of our analyses and increasing the risk of nonresponse bias; considering this possibility, however, physician practice setting was the only identified, statistically significant difference between survey responders and non-responders, and there were no significant differences in responses to the clinical vignette or hours of palliative care training by practice setting, suggesting that this difference in responders and non-responders had minimal impact on the generalizability of our findings. We do acknowledge, however, that there still may have been other unmeasurable differences between responders and non-responders leading to potential nonresponse bias. Lastly, our survey was limited by recall bias. Because the median number of years in practice among responders and non-responders was 14 years, physician recollection of palliative care training in residency and fellowship is subject to error. Considering this possibility, hwe did not want to limit our analysis to only newly practicing physicians, becuase this would further limit our sample size (increasing the possibility of a type II error) and decrease the generalizability of our findings. Although we did find that physicians who have been in practice ≥14 years reported significantly less palliative care training in residency compared to those in practice for less than 14 years, this finding may reflect the recent introduction of palliative care training in GME and, therefore, current training improvements.

In conclusion, decision-making for patientts with advanced cancer who develop surgical conditions is extremely complex requiring advanced physician and surgical training in end-of-life care. Palliative care training among surgeons is therefore, critical, but as observed in this survey of surgeons and medical physicians, this ttraining appears to be is lacking. This is a potential quality of care issue for patients with advanced cancer, becuase the absence of palliative care training is associated with more aggressive recommendations of operative intervention by physicians in scenarios where less aggressive treatment alternatives exist. Therefore, greater efforts incorporating palliative care training in graduate and continuing medical education must be adopted system-wide by surgery l residencies and national societies to address this absence of adequate surgical palliative care training. Such efforts should include the incorporation of structured empirically-validated palliative training programs.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

## Acknowledgments

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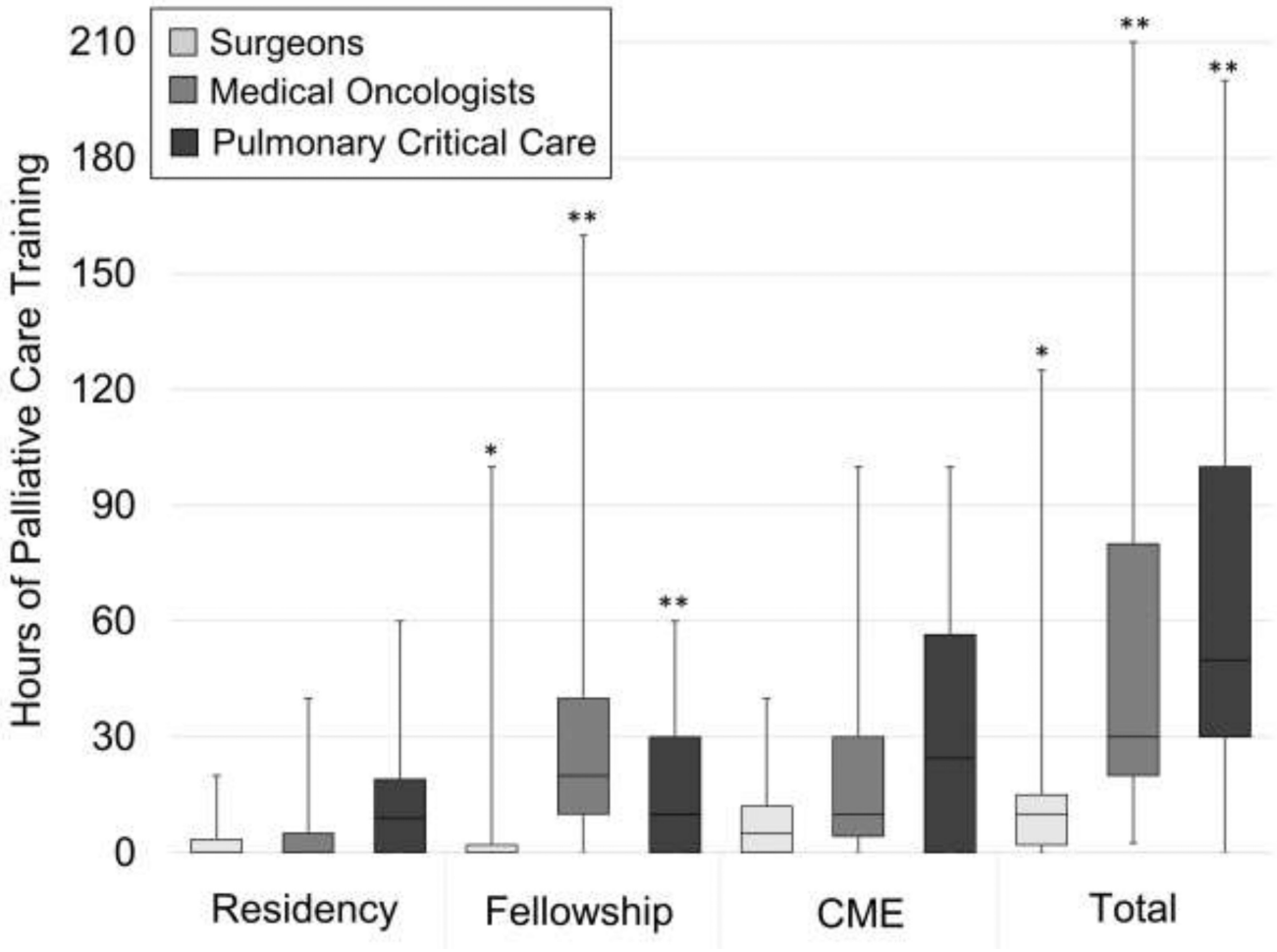


**Figure 1.**

Comparison of Hours of Palliative Care Training by Specialty. Surgeons reported less palliative care training during fellowship and in total compared to medical oncologists and pulmonary critical care physicians (* vs. ** $p<0.05$). *CME*, continuing medical education.

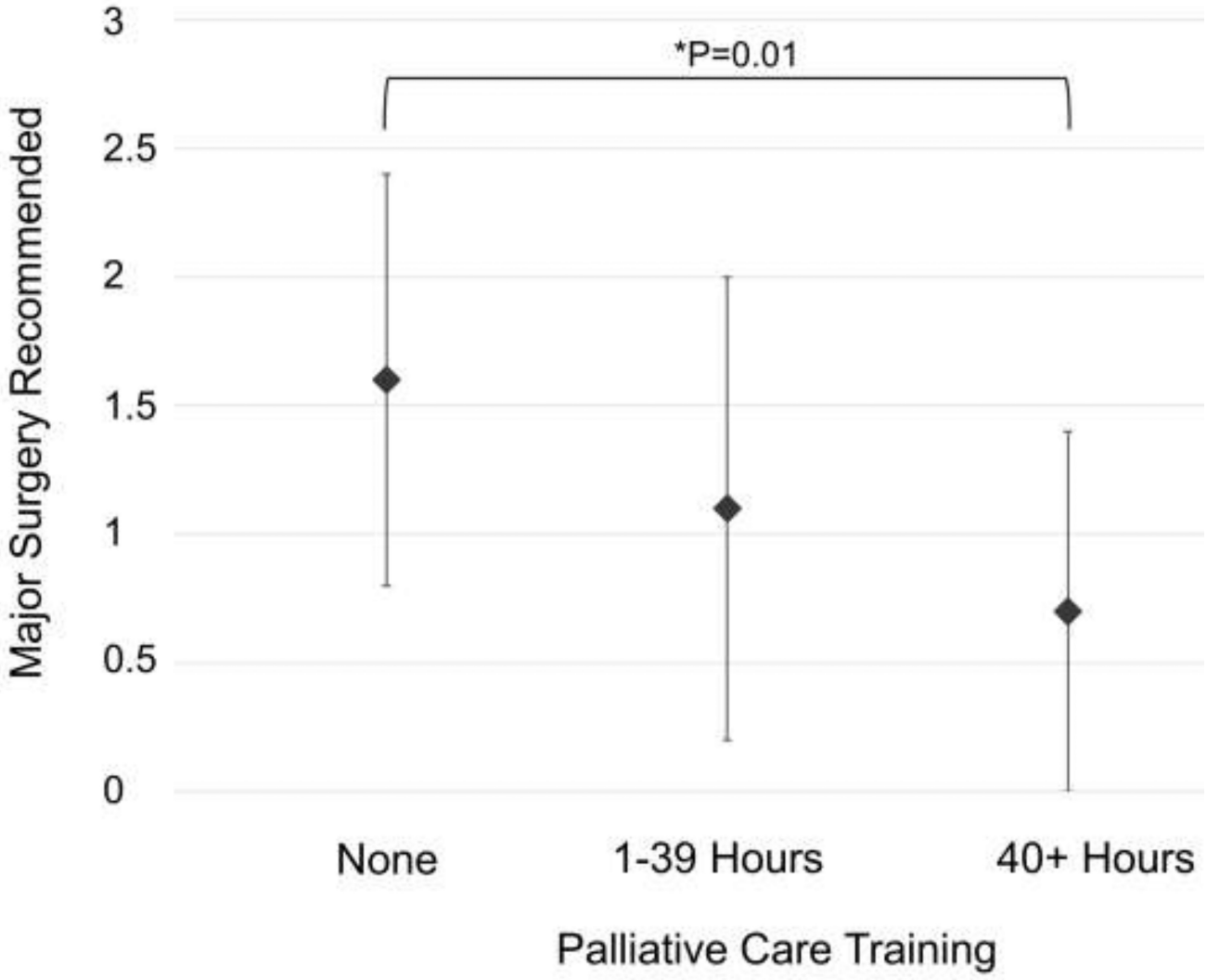


**Figure 2.**

Palliative Care Training and Number of Instances Major Surgical Intervention Selected in Clinical Vignettes. Physicians with no palliative care training selected major surgical intervention as their treatment recommendation more often compared to physicians with 40 or more hours of palliative care training (*p=0.01).

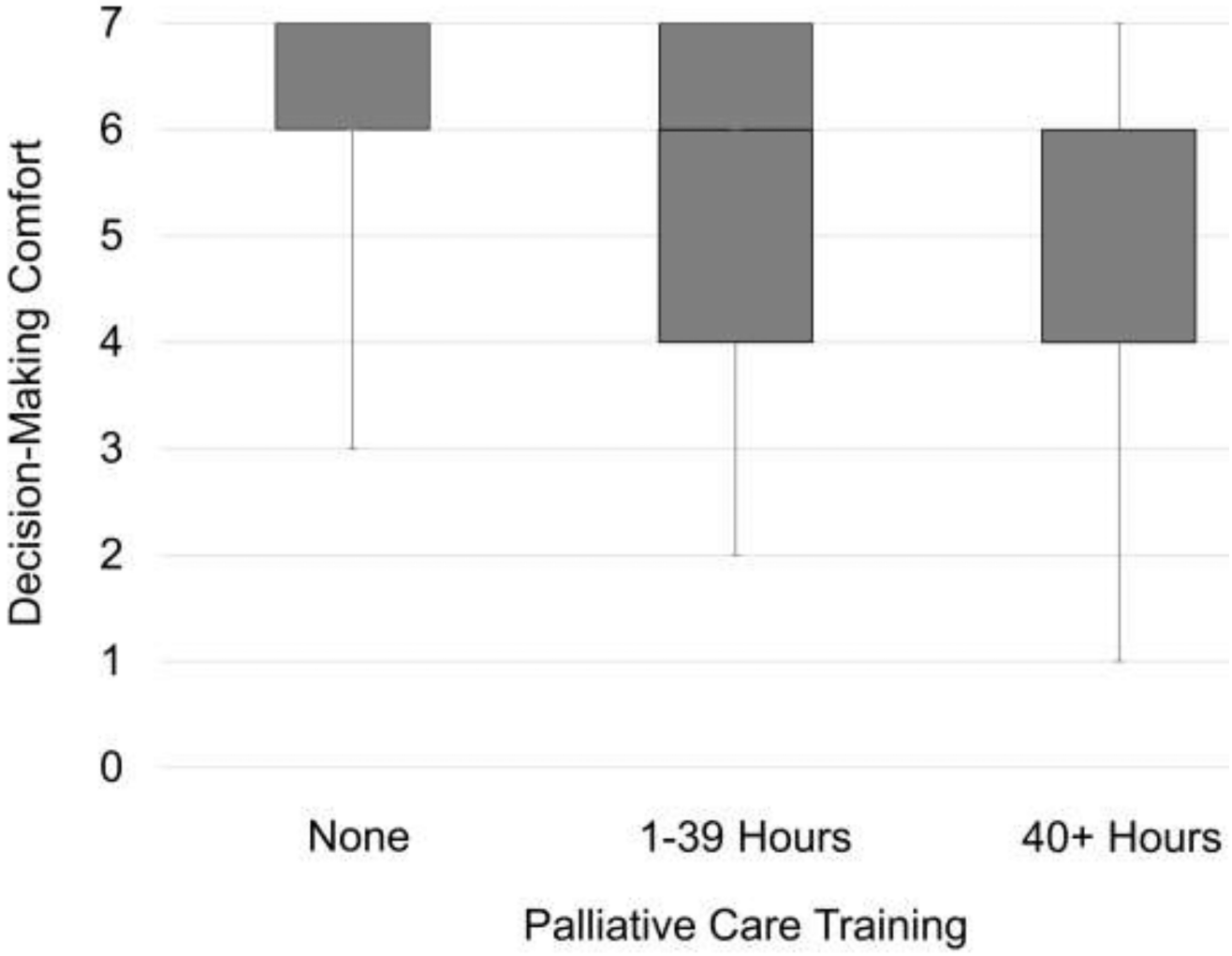


**Figure 3.**

Clinical Vignette Decision Making Comfort and Palliative Care Training. There were no differences in self-reported comfort with decision making in the four clinical vignettes by palliative care training. Physicians reported their comfort with decision making comfort on a 7-point Likert scale. The median self-reported decision-making comfort was 6, “moderately comfortable,” regardless of palliative care training.

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## Table 1

Malignant bowel obstruction vignette.

**Case 1. Patient A is an otherwise healthy 55-year old man with history of poorly differentiated adenocarcinoma of the appendix. He has maintained a normal lifestyle, though recently was found to have widespread carcinomatosis. He presented to the Emergency room with crampy abdominal pain and distension, no flatus or bowel movement for 3 days. Abdominal series is consistent with a complete bowel obstruction. The white blood cell count is 15,000. While participating in a patient and family discussion with the palliative care team, you recommend the following:**

| | | Surgeons | | Medical Physicians | | |
|---|---|---|---|---|---|---|
| **Treatment Options** | | **N** | **%** | **N** | **%** | **P value** |
| 1. | Nonsurgical management (nasogastric tube decompression, bowel rest) | 9 | 16.4% | 7 | 17.9% | 0.48 |
| 2. | Nonsurgical management with surgical intervention if patient does not improve | 23 | 41.8% | 17 | 43.6% | |
| 3. | Nonsurgical treatment (chemo- or radiation therapy) | 1 | 1.8% | 1 | 2.6% | |
| 4. | Major surgical intervention (e.g. laparotomy with bowel resection/colostomy) | 8 | 14.5% | 7 | 17.9% | |
| 5. | Minor surgical intervention (e.g. laparoscopic or open gastrostomy tube) | 3 | 5.5% | 5 | 12.8% | |
| 6. | Minor procedure (e.g. percutaneous endoscopic gastrostomy tube) | 8 | 14.5% | 2 | 5.1% | |
| 7. | Hospice care | 3 | 5.5% | 0 | 0.0% | |
| **Goals of Intervention** | | | | | | |
| 1. | Relief of symptoms | 46 | 83.6% | 37 | 97.4% | 0.06 |
| 2. | Cure of acute disease | 3 | 5.5% | 1 | 2.6% | |
| 3. | Comfort care | 6 | 10.9% | 0 | 0.0% | |
| **Factors Impacting Treatment Decision making** | | | | | | |
| 1. | Age | 14 | 25.5% | 12 | 30.8% | 0.64 |
| 2. | Patient functional status | 30 | 54.5% | 22 | 56.4% | 1.00 |
| 3. | Expected survival time | 26 | 47.3% | 13 | 33.3% | 0.21 |
| 4. | Aggressiveness of tumor | 22 | 40.0% | 10 | 25.6% | 0.19 |
| 5. | Morbidity of procedure | 21 | 38.2% | 15 | 38.5% | 1.00 |
| 6. | Unclear objectives | 6 | 10.9% | 5 | 12.8% | 1.00 |
| 7. | Potential cure with surgery or other intervention | 5 | 9.1% | 4 | 10.3% | 1.00 |
| 8. | Potential for pain or symptom relief | 30 | 54.5% | 28 | 71.8% | 0.13 |

**Case 1. Patient A is an otherwise healthy 55-year old man with history of poorly differentiated adenocarcinoma of the appendix. He has maintained a normal lifestyle, though recently was found to have widespread carcinomatosis. He presented to the Emergency room with crampy abdominal pain and distension, no flatus or bowel movement for 3 days. Abdominal series is consistent with a complete bowel obstruction. The white blood cell count is 15,000. While participating in a patient and family discussion with the palliative care team, you recommend the following:**

| | | Surgeons | | Medical Physicians | | |
|---|---|---|---|---|---|---|
| **Treatment Options** | | **N** | **%** | **N** | **%** | **P value** |
| 9. | Potential for symptom avoidance | 8 | 14.5% | 9 | 23.1% | 0.42 |
| 10. | Other | 4 | 7.3% | 2 | 5.1% | 1.00 |
| **Provider Responsible for End of Life Goals of Care Discussion** | | | | | | |
| 1. | Primary care physician | 4 | 7.3% | 2 | 5.1% | 0.02 |
| 2. | Medical Oncologist | 14 | 25.5% | 18 | 46.2% | |
| 3. | General Surgeon | 11 | 20.0% | 0 | 0.0% | |
| 4. | Surgical Oncologist | 9 | 16.4% | 7 | 17.9% | |
| 5. | Palliative Care Physician | 14 | 25.5% | 8 | 20.5% | |
| 6. | Other | 3 | 5.5% | 4 | 10.3% | |

## Table 2

Gastrointestinal bleed in setting of metastatic lung cancer vignette.

**Case 2. Patient B is a 70-year old man with history of smoking and non-small cell lung carcinoma in two lobes of his right lung and mediastinal lymph node involvement. He lives at home with his wife and is not on home oxygen. He can perform independently activities in daily living. He was recently diagnosed with a brain metastasis, and presents with a recurrent gastrointestinal bleed which has been localized by endoscopy to be approximately 10cm distal to the ligament of Trietz and is not amenable to endoscopic treatment. He has received 6 Units of packed red blood cells. While participating in a patient and family discussion with the palliative care team, you recommend the following:**

| | | Surgeons | | Medical Physicians | | |
|---|---|---|---|---|---|---|
| **Treatment Options** | | **N** | **%** | **N** | **%** | **P value** |
| 1. | Nonsurgical management (continue to transfuse blood products) | 0 | 0.0% | 4 | 10.3% | 0.0002 |
| 2. | Nonsurgical management with surgical intervention if patient does not improve | 7 | 12.7% | 5 | 12.8% | |
| 3. | Nonsurgical treatment (chemo-or radiation therapy) | 0 | 0.0% | 1 | 2.6% | |
| 4. | Major surgical intervention (e.g. laparotomy with bowel resection) | 16 | 29.1% | 0 | 0.0% | |
| 5. | Minor surgical intervention | 2 | 3.6% | 1 | 2.6% | |
| 6. | Minor procedure (e.g. transcatheter embolization) | 26 | 47.3% | 22 | 56.4% | |
| 7. | Hospice care | 4 | 7.3% | 6 | 15.4% | |
| **Goals of Intervention** | | | | | | |
| 1. | Relief of symptoms | 26 | 47.3% | 24 | 61.5% | 0.11 |
| 2. | Cure of acute disease | 24 | 43.6% | 9 | 23.1% | |
| 3. | Comfort care | 5 | 9.1% | 6 | 15.4% | |
| **Factors Impacting Treatment Decision making** | | | | | | |
| 1. | Age | 4 | 7.3% | 6 | 15.4% | 0.31 |
| 2. | Patient functional status | 36 | 65.5% | 19 | 48.7% | 0.14 |
| 3. | Expected survival time | 25 | 45.5% | 28 | 71.8% | 0.01 |
| 4. | Aggressiveness of tumor | 7 | 12.7% | 10 | 25.6% | 0.17 |
| 5. | Morbidity of procedure | 24 | 43.6% | 17 | 43.6% | 1.00 |
| 6. | Unclear objectives | 1 | 1.8% | 3 | 7.7% | 0.31 |
| 7. | Potential cure with surgery or other intervention | 24 | 43.6% | 6 | 15.4% | 0.004 |
| 8. | Potential for pain or symptom relief | 29 | 52.7% | 18 | 46.2% | 0.68 |

**Case 2. Patient B is a 70-year old man with history of smoking and non-small cell lung carcinoma in two lobes of his right lung and mediastinal lymph node involvement. He lives at home with his wife and is not on home oxygen. He can perform independently activities in daily living. He was recently diagnosed with a brain metastasis, and presents with a recurrent gastrointestinal bleed which has been localized by endoscopy to be approximately 10cm distal to the ligament of Trietz and is not amenable to endoscopic treatment. He has received 6 Units of packed red blood cells. While participating in a patient and family discussion with the palliative care team, you recommend the following:**

| | | Surgeons | | Medical Physicians | | |
|---|---|---|---|---|---|---|
| **Treatment Options** | | **N** | **%** | **N** | **%** | **P value** |
| 9. | Potential for symptom avoidance | 9 | 16.4% | 9 | 23.1% | 0.44 |
| 10. | Other | 3 | 5.5% | 3 | 7.7% | 0.69 |
| **Provider Responsible for End of Life Goals of Care Discussion** | | | | | | |
| 1. | Primary care physician | 3 | 5.5% | 3 | 7.7% | 0.17 |
| 2. | Medical Oncologist | 14 | 25.5% | 18 | 46.2% | |
| 3. | General Surgeon | 12 | 21.8% | 2 | 5.1% | |
| 4. | Surgical Oncologist | 5 | 9.1% | 3 | 7.7% | |
| 5. | Palliative Care Physician | 16 | 29.1% | 10 | 25.6% | |
| 6. | Other | 5 | 9.1% | 3 | 7.7% | |

**Table 3**

Lung entrapment in setting of trauma and metastatic breast cancer vignette.

| **Case 3. Patient C is 55-year old woman with a history of Stage IV breast cancer with metastasis to her liver on chemotherapy. She has been living at home with her family. She presents status post a high speed motor vehicle accident. She has a closed head injury, flail chest with hemothorax on left side, and bilateral lung contusions. In five days, after being unable to be weaned from the ventilator, there is evidence of the left lung being entrapped. While participating in a patient and family discussion with the palliative care team, you recommend the following:** | | | | | | |
|---|---|---|---|---|---|---|
| | | **Surgeons** | | **Medical Physicians** | | |
| **Treatment Options** | | **N** | **%** | **N** | **%** | **P value** |
| 1. | Nonsurgical management (continue supportive ICU care) | 1 | | 1 | | 0.09 |
| 2. | Nonsurgical management with surgical intervention if patient does not improve | 1 | | 5 | 12.8% | |
| 3. | Nonsurgical treatment (chemo- or radiation therapy) | 0 | | 0 | | |
| 4. | Major surgical intervention (e.g. VATS or open thoracotomy decortication) | 17 | 33% | 6 | 15% | |
| 5. | Minor surgical intervention (e.g. chest tube and/or tracheostomy) | 13 | 2% | 6 | 15% | |
| 6. | Minor procedure (e.g. pigtail catheter, percutaneous tracheostomy) | 6 | 12% | 5 | 13% | |
| 7. | Hospice care/withdrawal of care | 14 | 27% | 16 | 41% | |
| Goals of Intervention | | | | | | |
| 1. | Relief of symptoms | 20 | 38% | 13 | 35% | 0.62 |
| 2. | Cure of acute disease | 18 | 34% | 10 | 27% | |
| 3. | Comfort care | 15 | 28% | 14 | 388% | |
| Factors Impacting Treatment Decision making | | | | | | |
| 1. | Age | 11 | 20% | 7 | 17.9% | 0.80 |
| 2. | Patient functional status | 29 | 55% | 17 | 43.6% | 0.40 |
| 3. | Expected survival time | 28 | 53% | 30 | 76.9% | 0.03 |
| 4. | Aggressiveness of tumor | 3 | 6% | 7 | 17.9% | 0.09 |
| 5. | Morbidity of procedure | 24 | % | 16 | 41.0% | 0.83 |
| 6. | Unclear objectives | 7 | 13.2% | 7 | 17.9% | 0.57 |
| 7. | Potential cure with surgery or other intervention | 21 | 40% | 12 | 30.8% | 0.51 |
| 8. | Potential for pain or symptom relief | 23 | 43% | 16 | 41.0% | 0.83 |

**Case 3. Patient C is 55-year old woman with a history of Stage IV breast cancer with metastasis to her liver on chemotherapy. She has been living at home with her family. She presents status post a high speed motor vehicle accident. She has a closed head injury, flail chest with hemothorax on left side, and bilateral lung contusions. In five days, after being unable to be weaned from the ventilator, there is evidence of the left lung being entrapped. While participating in a patient and family discussion with the palliative care team, you recommend the following:**

| | | Surgeons | | Medical Physicians | | |
|---|---|---|---|---|---|---|
| **Treatment Options** | | **N** | **%** | **N** | **%** | **P value** |
| 9. | Potential for symptom avoidance | 4 | % | 3 | 7.7% | 1.00 |
| 10. | Other | 7 | 13.2% | 5 | 12.8% | 1.00 |
| Provider Responsible for End of Life Goals of Care Discussion | | | | | | |
| 1. | Primary care physician | 3 | .6% | 1 | | 0.03 |
| 2. | Medical Oncologist | 6 | 11% | 12 | 32% | |
| 3. | General Surgeon | 22 | 41% | 6 | 16% | |
| 4. | Surgical Oncologist | 0 | | 0 | | |
| 5. | Palliative Care Physician | 12 | 22.2% | 10 | 26% | |
| 6. | Other | 11 | % | 9 | 247% | |

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## Table 4

Symptomatic inguinal hernia in setting of metastatic prostate cancer vignette.

| **Case 4. Patient D is a 65-year-old man with a history of metastatic prostate cancer and no other medical history presenting to the clinic complaining of swelling and discomfort in his right groin for a few weeks. He is functional at home and enjoys working with his tomato plants. Exam reveals a right groin hernia which is tender but reducible. There is no evidence of incarceration. Patient states that the pain makes it difficult to take care of his plants. While participating in a patient and family discussion in clinic, you recommend the following:** | | | | | | |
|---|---|---|---|---|---|---|
| | | **Surgeons** | | **Medical Physicians** | | |
| **Treatment Options** | | **N** | **%** | **N** | **%** | **P value** |
| 1. | Nonsurgical management (truss, advise against heavy lifting) | 1 | | 3 | 8% | 0.06 |
| 2. | Nonsurgical management with surgical intervention if patient does not improve | 3 | 6% | 7 | 18% | |
| 3. | Nonsurgical treatment (chemo- or radiation therapy) | 0 | | 0 | | |
| 4. | Major surgical intervention (e.g inguinal hernia repair under general anesthesia) | 30 | 56% | 13 | 33% | |
| 5. | Minor surgical intervention (e.g. inguinal hernia repair with local anesthesia) | 19 | 35% | 16 | 41% | |
| 6. | Minor procedure | 1 | | 0 | | |
| 7. | Hospice care | 0 | | 0 | | |
| **Goals of Intervention** | | | | | | |
| 1. | Relief of symptoms | 32 | 59% | 26 | 68% | 0.39 |
| 2. | Cure of acute disease | 22 | 41% | 12 | 32% | |
| 3. | Comfort care | 0 | | 0 | | |
| **Factors Impacting Treatment Decision making** | | | | | | |
| 1. | Age | 4 | 7% | 7 | 18% | 0.19 |
| 2. | Patient functional status | 49 | 91% | 28 | 72% | 0.03 |
| 3. | Expected survival time | 25 | 46% | 31 | 80% | 0.001 |
| 4. | Aggressiveness of tumor | 3 | 6% | 7 | 18% | 0.09 |
| 5. | Morbidity of procedure | 26 | 48. | 8 | 21% | 0.009 |
| 6. | Unclear objectives | 0 | | 2 | | 0.17 |
| 7. | Potential cure with surgery or other intervention | 27 | 50% | 15 | 9% | 0.3 |
| 8. | Potential for pain or symptom relief | 27 | 50% | 18 | 46% | 0.83 |
| 9. | Potential for symptom avoidance | 2 | | 3 | 8% | 0.65 |

| **Case 4. Patient D is a 65-year-old man with a history of metastatic prostate cancer and no other medical history presenting to the clinic complaining of swelling and discomfort in his right groin for a few weeks. He is functional at home and enjoys working with his tomato plants. Exam reveals a right groin hernia which is tender but reducible. There is no evidence of incarceration. Patient states that the pain makes it difficult to take care of his plants. While participating in a patient and family discussion in clinic, you recommend the following:** | | | | | | |
|---|---|---|---|---|---|---|
| | | **Surgeons** | | **Medical Physicians** | | |
| **Treatment Options** | | **N** | **%** | **N** | **%** | **P value** |
| 10. | Other | 0 | | 2 | | 0.17 |
| **Provider Responsible for End of Life Goals of Care Discussion** | | | | | | |
| 1. | Primary care physician | 8 | 15% | 3 | 8% | 0.003 |
| 2. | Medical Oncologist | 8 | 15% | 18 | 46% | |
| 3. | General Surgeon | 30 | 56% | 14 | 36% | |
| 4. | Surgical Oncologist | 2 | | 0 | | |
| 5. | Palliative Care Physician | 4 | 7% | 0 | | |
| 6. | Other | 2 | | 4 | 10% | |

*ICU*, intensive care unit; *VATS*, video assisted thorascopic surgery;

## Table 5

Comparison of Responding Physicians to the Entire Cohort of Sacramento Area Physicians

| | Responding Physicians (N=102) | | Sacramento Area Physician Cohort (N=299) | |
|---|---|---|---|---|
| | **N** | **%** | **N** | **%** |
| Male Sex * | 77 | 82.8% | 217 | 73.1% |
| Years in Practice Median, IQR | 14 | 5–22 | 14 | 7–24 |
| Practice Setting * | | | | |
| University | 45 | 48.9% | 78 | 26.1% |
| Community | 43 | 46.7% | 211 | 70.6% |
| Veterans Affairs | 4 | 4.3% | 10 | 3.3% |
| Specialty * | | | | |
| Surgeon | 55 | 59.1% | 137 | 45.8% |
| *General (No Fellowship)* | 14 | 25.5% | 51 | 37.5% |
| *Surgical Critical Care* | 22 | 40.0% | 32 | 23.5% |
| *Surgical Oncology* | 7 | 12.7% | 12 | 8.8% |
| *Colorectal* | 2 | 3.6% | 11 | 8.1% |
| *Minimally Invasive* | 4 | 7.3% | 16 | 11.8% |
| *Gynecologic Oncology* | 3 | 5.5% | 9 | 6.6% |
| *Other* | 3 | 5.5% | 5 | 3.7% |
| Medical Oncology | 18 | 19.4% | 74 | 24.7% |
| Pulmonary Critical Care | 13 | 14.0% | 76 | 25.4% |
| Palliative Care | 7 | 7.5% | 12 | 4.1% |

* Due to missing data, sum of numbers may not equal sample size.

Other: endocrine, hepatopancreatobiliary (HPB), and thoracic.