Do Specialists Differ on Do-Not-Resuscitate Decisions?*

William F. Kelly, MD; Arn H. Eliasson, MD; Derek J. Stocker, MD; and Oleh W. Hnatiuk, MD

**Study objective:** Opinions regarding do-not-resuscitate (DNR) decisions differ between individual physicians. We attempted to determine whether the strength of DNR recommendations varies with medical specialty and experience.

**Design:** Written survey.

**Participants:** Physicians from the pulmonary/critical-care medicine (PCCM), cardiology, internal medicine, gastroenterology, hematology/oncology, and infectious disease services as well as the Department of Medicine house staff at our tertiary-care referral center participated in the study.

**Interventions:** Physicians were asked confidentially to quantify the strength of their opinions on discussing and recommending DNR orders for each of 20 vignettes made from the summaries of actual cases. Reasons for their opinions and demographic data also were recorded.

**Measurements and results:** One hundred fifteen of 155 physicians (74%) responded. PCCM physicians (mean ± SD DNR score, 157 ± 22) more strongly recommended DNR orders than cardiologists (mean DNR score, 122 ± 32; p = 0.006), house staff (mean DNR score, 132 ± 24; p = 0.014), and general internists (mean DNR score, 129 ± 30; p = 0.043). PCCM physicians also trended toward recommending DNR orders for more of the 20 patients described in the vignettes compared to cardiologists (mean DNR number, 16.5 ± 3.0 vs 11.9 ± 5.8, respectively; p = 0.066). There were no differences between PCCM physicians and hematology/oncology, infectious disease, and gastroenterology specialists. Among the house staff, the likelihood of recommending a DNR order correlated significantly with increasing years of experience (r = 0.45; p = 0.002). The opposite trend was present in the specialty staff groups. No significant differences in opinion by gender, religion, or personal experiences were found.

**Conclusions:** The strength of DNR order recommendations varies with medicine specialty and years of training and experience. An awareness of these differences and the determination of the reasons behind them may help to target educational interventions and to ensure effective collaboration with colleagues and communication with patients.

**Key words:** advance directives; cardiopulmonary resuscitation; do-not-resuscitate; end-of-life; resuscitation; specialists; specialty; training

**Abbreviations:** CHF = congestive heart failure; DNR = do-not-resuscitate; PCCM = pulmonary and critical-care medicine

Factors influencing end-of-life decisions and practices have been extensively studied. Patient preferences¹ and epidemiologic information² (eg, age and disease severity), as well as physician attitudes³–⁵ play pivotal roles in these discussions. Patients look to their physicians to open the dialogue about such issues.⁶ Through experience and training, physicians are uniquely equipped to help patients with deci-

*From the Pulmonary and Critical Care Medicine Service, Walter Reed Army Medical Center, Washington, DC.


The authors are US government employees. The opinion or assertions contained herein are the private views of the authors and are not to be construed as official or as reflecting the views of the Department of the Army or the Department of the Defense or any US government agency.

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Correspondence to: William Kelly, MD, Pulmonary and Critical Care Medicine, Walter Reed Army Medical Center, Washington, DC 20307; e-mail: WilliamKellyMD@AOL.com
essions at the end of life. The results of the Study to Understand Prognosis and Preferences for Outcomes and Risks of Treatment Practice showed that practice patterns vary between specialties concerning end-of-life care. Therefore, it is of interest to understand the variations in beliefs and practices regarding do-not-resuscitate (DNR) orders and end-of-life care that exist among physicians.

We have found previously that physicians frequently experience “road-blocks” to writing DNR orders even when clinical circumstances suggest that a DNR order is appropriate. The most frequently experienced impediments were those circumstances that limited the length and depth of the physician-patient relationship. Without such a relationship, it is difficult to learn a patient’s life values and goals and to blend them with our knowledge of disease prognosis and resuscitation outcomes.

In the study we report here, the physician side of this exchange was isolated. How the physician-patient relationship is conducted, and how one communicates with a patient may be learned behaviors that are shaped largely by role models in training programs. These behaviors then may be modified by experiences from clinical practice. We attempted to determine whether the strength of DNR order recommendations varied with medical specialty and with the number of years of experience at our hospital.

**Materials and Methods**

Physicians at our tertiary-care referral center were separated into the following seven groups: pulmonary and critical-care medicine (PCCM); cardiology; internal medicine; gastroenterology; hematology/oncology; infectious disease; and medicine house staff. All physicians in these groups were invited personally to confidentially complete the study questionnaire, which consisted of 20 clinical vignettes (see “Appendix”). The vignettes were case summaries of patients who had been treated at our institution. Cases were selected to represent a spectrum of patient demographics and internal medicine problems using predetermined criteria for disease severity. These vignettes were listed in the same order for all groups.

Survey participants were instructed to consider themselves as the ward attending physician and to decide whether or not they would advocate a DNR order when asked for their opinion by the patient or next of kin. They then had to quantify the strength of their opinion. Possible scores for each case ranged from 1 (most strongly opposed to DNR order) through 10 (most strongly in favor of DNR order). For five of the vignettes, participants also were asked to give a reason for their decision. They could choose from a provided list of reasons or could record their own. Additional demographic data were collected including physician age, gender, religion, influential personal events, type of medical practice and years of experience. The PCCM physicians completed the survey on two different occasions, 1 year apart, as a measure of internal validity. Fellows in their first year of training were categorized as house staff, while senior fellows in training were grouped with the house staff.

Answers to the 20 questions were summed for a composite DNR score (possible score range, 20 to 200) for each specialty. Comparisons between two groups (eg, male vs female physicians) were made using the two-sample t test. Comparisons among more than two groups were made using one-way analysis of variance, with post hoc pairwise comparisons made using a Tukey test. Changes in scores over time were compared using the paired t test. The association of DNR score and years since graduation from medical school was examined using the Pearson correlation coefficient. Data were analyzed using computer software (SPSS, version 9.0; SPSS, Inc; Chicago, IL). This study was reviewed and approved by the investigational review board at our institution.

Of the 155 questionnaires distributed, 115 (74%) were returned. Table 1 provides demographic information grouped by subspecialty. Blank answers to individual questions were rare (0.44%) and were

<table>
<thead>
<tr>
<th>Specialty</th>
<th>No. (%)</th>
<th>Age, yr</th>
<th>Male, %</th>
<th>Experience, yr</th>
<th>DNR Score</th>
<th>DNR No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal medicine</td>
<td>14/17 (82)</td>
<td>41.2</td>
<td>79</td>
<td>16.6</td>
<td>129 ± 30†</td>
<td>12.9 ± 4.2</td>
</tr>
<tr>
<td>Cardiology</td>
<td>12/18 (67)</td>
<td>38.4</td>
<td>100</td>
<td>12.8</td>
<td>122 ± 32‡</td>
<td>11.9 ± 5.8</td>
</tr>
<tr>
<td>Gastroenterology</td>
<td>12/14 (86)</td>
<td>41.1</td>
<td>100</td>
<td>13.5</td>
<td>132 ± 21</td>
<td>14.5 ± 4.2</td>
</tr>
<tr>
<td>Hematology/oncology</td>
<td>7/12 (58)</td>
<td>41.0</td>
<td>100</td>
<td>16.0</td>
<td>140 ± 21</td>
<td>16.1 ± 3.9</td>
</tr>
<tr>
<td>Infectious disease</td>
<td>10/16 (63)</td>
<td>38.5</td>
<td>80</td>
<td>14.0</td>
<td>142 ± 25</td>
<td>15.0 ± 4.2</td>
</tr>
<tr>
<td>House Staff</td>
<td>45/55 (82)</td>
<td>29.5</td>
<td>87</td>
<td>3.6</td>
<td>132 ± 24§</td>
<td>13.5 ± 4.0</td>
</tr>
<tr>
<td>PCCM</td>
<td>15/23 (65)</td>
<td>35.7</td>
<td>88</td>
<td>10.7</td>
<td>157 ± 22‖</td>
<td>16.5 ± 3.0</td>
</tr>
<tr>
<td>Mean</td>
<td>115/155 (74)</td>
<td>37.9</td>
<td>89</td>
<td>12.5</td>
<td>NA</td>
<td>NA</td>
</tr>
</tbody>
</table>

*Experience = mean number of years working as a physician after medical school graduation; DNR No. = mean number of recommendations for DNR orders among the 20 case vignettes; NA = not applicable; DNR Score = mean sum of scaled responses (higher scores favor DNR more strongly).

†p = 0.043 vs PCCM.
‡p = 0.006 vs PCCM.
§p = 0.014 vs PCCM.
‖p > 0.05 vs other specialties.

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excluded from the statistical analysis. There were no significant differences in physician ages within the various subspecialties. Groups were similar in terms of number of years of experience, with the exception of general internists who worked more years than did PCCM physicians. As may be expected, physicians on the house staff were significantly younger and had fewer years of experience than did physicians in each of the subspecialty groups. Most physicians were men (89%) and reported being part of a religious denomination (70%). There was no difference in DNR scores between male and female physicians (mean DNR score, 136 ± 27 vs 127 ± 17, respectively; p = 0.85). Those physicians who claimed a religious background trended toward more strongly recommending a DNR order (mean DNR score, 137 ± 28 vs 130 ± 21, respectively; p = 0.08). Physicians who had personal/familial experiences with DNR decisions (30%) were no more or less likely to recommend a DNR order than those without (mean DNR score, 137 ± 25 vs 133 ± 27; p = 0.11).

The mean total scaled responses assessing strength of opinions ranged from 122 to 157 of a possible score of 200 (Table 1). PCCM physician scores (mean DNR score, 157 ± 22) were significantly higher (ie, they recommended DNR orders more strongly) than those for cardiologists (mean DNR score, 122 ± 32; p = 0.006), house staff (mean DNR score, 132 ± 24; p = 0.014), and general internists (mean DNR score, 129 ± 30; p = 0.043). Most of these differences were due to answers to vignettes 2 to 4, 7, 9, 16, 19, and 20. The mean number of the 20 patients recommended for DNR orders ranged from 11.9 ± 6 among cardiologists to 16.5 ± 3 among PCCM physicians (p = 0.066) [Table 1].

DNR scores were not significantly different when comparing PCCM physicians to gastroenterologists, hematologist/oncologists, or infectious disease physicians. When PCCM physicians repeated the questionnaire 1 year later, 13 (87%) varied < 10% from their original answers.

DNR scores correlated significantly with years of experience. More senior physicians on the house staff and fellows had higher DNR scores (ie, they more strongly recommended DNR orders) than did interns and junior residents (r = 0.45; p = 0.002). On the other hand, in all of the specialty staff groups, more experienced physicians tended to recommend DNR orders less strongly. However, this trend reached statistical significance only for infectious disease (r = -0.73; p = 0.016).

Table 2 shows the varied reasons given for and against recommending DNR orders. Physicians in favor of issuing a DNR order for a patient often cited as criteria the lack of therapy for the underlying disease or the low probability of surviving a cardiac or respiratory arrest. Others noted the poor quality of life after the patient has undergone cardiopulmonary resuscitation, even if it was successful. Few respondents based their decisions on poor quality of life prior to an arrest, and no one cited medical costs. Reasons given for not implementing DNR orders also varied. No one listed medicolegal concerns, and moral opposition was rare. Most often, a low likelihood of arrest during this particular hospital admission or unfamiliarity with the underlying disease prognosis were cited.

### Table 2—Reasons Given for DNR Decisions by Specialty

<table>
<thead>
<tr>
<th>Reason</th>
<th>Internal Medicine</th>
<th>Cardiology</th>
<th>Gastroenterology</th>
<th>Hematology/Oncology</th>
<th>Infectious Disease</th>
<th>House Officers</th>
<th>PCCM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>For DNR order</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underlying disease has a poor prognosis</td>
<td>23 (46)</td>
<td>13 (29)</td>
<td>12 (21)</td>
<td>11 (30)</td>
<td>9 (18)</td>
<td>75 (46)</td>
<td>31 (38)</td>
</tr>
<tr>
<td>Resuscitation attempt would be futile</td>
<td>20 (40)</td>
<td>24 (52)</td>
<td>28 (48)</td>
<td>16 (43)</td>
<td>20 (40)</td>
<td>56 (35)</td>
<td>48 (50)</td>
</tr>
<tr>
<td>Poor quality of life before resuscitation</td>
<td>3 (6)</td>
<td>2 (4)</td>
<td>5 (9)</td>
<td>1 (3)</td>
<td>2 (4)</td>
<td>7 (4)</td>
<td>0</td>
</tr>
<tr>
<td>Poor quality of life after resuscitation</td>
<td>3 (6)</td>
<td>4 (9)</td>
<td>8 (14)</td>
<td>9 (24)</td>
<td>19 (38)</td>
<td>21 (13)</td>
<td>2 (2)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (2)</td>
<td>3 (7)</td>
<td>5 (9)</td>
<td>0</td>
<td>0</td>
<td>3 (20)</td>
<td>1 (1)</td>
</tr>
<tr>
<td><strong>Against DNR order</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unlikely to arrest</td>
<td>4 (14)</td>
<td>4 (22)</td>
<td>7 (35)</td>
<td>1 (20)</td>
<td>6 (46)</td>
<td>27 (38)</td>
<td>4 (44)</td>
</tr>
<tr>
<td>DNR order not indicated</td>
<td>5 (18)</td>
<td>0</td>
<td>3 (15)</td>
<td>1 (20)</td>
<td>0</td>
<td>10 (14)</td>
<td>1 (11)</td>
</tr>
<tr>
<td>Morally opposed</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1 (1)</td>
<td>0</td>
</tr>
<tr>
<td>Unfamiliar with underlying disease prognosis</td>
<td>13 (46)</td>
<td>9 (50)</td>
<td>4 (20)</td>
<td>3 (60)</td>
<td>3 (23)</td>
<td>22 (31)</td>
<td>1 (11)</td>
</tr>
<tr>
<td>Other</td>
<td>6 (21)</td>
<td>5 (26)</td>
<td>6 (30)</td>
<td>0</td>
<td>4 (31)</td>
<td>12 (17)</td>
<td>3 (33)</td>
</tr>
</tbody>
</table>

*Values given as No. (%). Reasons for DNR decisions were requested for the last five clinical vignettes. Participants could pick from the above list or fill in “other.” Some answers were left blank. A reason and other were chosen twice.

**Discussion**

Our findings suggest that physicians in different internal medicine specialties, and with different levels of experience, vary in the strength of their recommendation of DNR orders. Willingness to limit care, specifically by recommending a DNR...
order, was statistically greater among PCCM physicians than among cardiologists, house staff, and general internists.

The clinical significance of such differences is unclear. When asked for an opinion, colleagues in different specialties often could agree on a DNR status (ie, yes vs no) despite a wide range of opinions (ie, DNR scores of 1 to 10) regarding its appropriateness. However, the number of patients who would have received a DNR order, all other things being equal, did vary with these opinions (eg, 20% more with PCCM providers than cardiologists).

Hanson et al.9 in a study using physician interviews, chart reviews, attitudinal questions, and two clinical vignettes, also demonstrated that cardiologists are less likely to limit care. Others10,11 have suggested that cardiologists have more difficulty dealing with terminally ill patients. The higher DNR scores for PCCM physicians may reflect their comfort in discussing, or having knowledge about, critical illness outcomes. Alternatively, one might conclude that PCCM physicians are wearied by frequent exposure to death and the suffering that often precedes it. Cardiologists, on the other hand, frequently see dramatic improvements in patients once interventions are made. In addition, patients who do not respond to these interventions often are transferred to the care of a thoracic surgeon. Likewise, internists can transfer poorly responding patients to a pulmonary/intensivist.

Our research demonstrates a distinct pattern reflecting a decreasing endorsement of DNR orders with greater distance from the residency training years. This may reflect a more recent emphasis on end-of-life issues, which is a response to perceived deficiencies in training programs in the past.12,13 Our finding contrasts with those of other reports, including those from a survey of Canadian ICU health-care workers.14 However, in that study, the gradient was due to differences within the staff physician groups as well as nurses. Our findings are supported by a survey of 653 Veteran Affairs physicians in whom younger age (and nongeneralist care) was associated with increased end-of-life discussions with patients.15

We did not find a difference among physicians along gender lines or among those physicians reporting a personal experience with end-of-life questions involving a family member or close friend. In contrast, the survey by Lawrence and Clark16 found that women favored resuscitation less than men. Our data show a trend toward recommending DNR orders among physicians who report a religious affiliation.

Previous work1,9,16,17 has demonstrated a bias against resuscitation in certain diseases (eg, cancer) and a bias for resuscitation in others (eg, congestive heart failure [CHF]), a difference that, perhaps, is due to inaccurate prognostic assumptions. Oncologists have been reported to make this distinction less often16 and to be more likely to withhold life-sustaining treatment in general.9,16 Older patients are also less likely to receive cardiopulmonary resuscitation.17 Physician bias toward the type of resuscitation withdrawn (eg, hemodialysis more than mechanical ventilation), although it is not specialty-dependent, also has been reported.4

The reasons given for recommending a DNR order were predominantly that attempted resuscitation would be futile or were associated with a very poor outcome. The infectious disease physicians frequently voiced concerns for the patients’ quality of life after resuscitation. No one listed medical costs as a reason for advocating DNR orders.

The two most common reasons for recommending against a DNR order were that the patient was unlikely to arrest during this hospitalization and that the physician was unfamiliar with the patient’s prognosis. This latter concern is supported by the fact that prognostic criteria for advanced lung, heart, or liver disease poorly determine the 6-month prognosis.17 Furthermore, such prognostic models apply to cohorts of patients and not to any one individual. Much less commonly was a DNR order thought not to be indicated or morally objectionable.

Varied opinions on DNR orders may be a cause or effect of specialty training. Certain personalities may be drawn to a particular field or may develop after similar training under the influence of senior physician mentors. Heffner and colleagues18 demonstrated discordant numbers of articles concerning end-of-life issues, with Index Medicus core pulmonary and critical-care medicine journals having 7 to 19 times more articles than those for cardiology, nephrology, or oncology.

Very few of the physicians made the decision to recommend DNR orders based on the current or preresuscitation quality of life of the patient. Value judgments should not be a part of the decision-making process when patients or their surrogates can express their own reasons, especially since physicians tend to underestimate the quality of life and the desire for life-sustaining treatment of chronically ill patients.4

There are several potential limitations of this study. The survey tool is based on case vignette and is, by definition, brief without a complete social context being supplied or in-depth patient interactions being possible. The order of vignettes may have affected decision making but was randomly selected and uniformly presented. Our survey tool has not been externally validated, but responses were consistent when readministered to the same physicians.
after 1 year. Physicians may be less aggressive in practice than on a questionnaire. However, vignettes were composed of real clinical courses and not hypothetical ones, as are those in other survey studies. Reviewing physicians’ own, and therefore different, patients would make meaningful comparisons impossible. Small sample sizes allow individual variability to affect group scores. The survey response rate can affect results, as the responses of nonresponders may be different than those of responders. However, assuming that respondents have more interest in DNR issues, there were still significant differences between groups. Physicians were mostly men and had similar religious backgrounds, possibly limiting generalizability. This consistency may make significant differences more likely to be specialty related. Results also may not apply to different clinical settings. For example, university-based intensivists have been shown to write DNR orders significantly more often than community-based intensivists. Additional demographic factors or other factors that were not studied may underlie some of the variability in decisions. Finally, there may have been an observation bias impacting decisions, in that physicians knew that they and their specialties were being evaluated.

An awareness of differences in DNR decision-making among specialists may allow more effective collaboration with colleagues and more consistent communication with patients.

APPENDIX: SURVEY VIGNETTES

The following vignettes are case summaries of patients who have been treated at our institution and were selected using predetermined criteria for disease severity.

Would You Recommend a DNR Order If Asked for an Opinion by Patient/Family Members?

Scale, 1 to 10; strongly opposed to DNR order, 1 to 5; strongly in favor of DNR order, 6 to 10.

1. A 69-year-old woman is admitted to the hospital with respiratory distress and hypoxia due to pneumonia. She carries a diagnosis of adenocarcinoma of unknown primary origin. Breast, GI, and gynecologic workups for the source of the adenocarcinoma are pending at the time of hospital admission. A tumor board has met and will decide on therapeutic options. Her medical history also includes hypertension, rheumatoid arthritis, and a chronic pleural effusion (secondary to the rheumatoid arthritis).

2. A 69-year-old man with a history of bipolar disorder, hypothyroidism, and tobacco abuse is admitted to the hospital with mental status changes, leukocytosis (WBC count, 31,000 cells/μL), and a right upper lobe lung mass. Empiric therapy for infection was not effective. CT scans demonstrate the lung mass and lesions to liver and bone to be consistent with metastases. The patient was unable to undergo bronchoscopy due to diminished mental status. The testing of other biopsy specimens was nondiagnostic. He is capable of minimal self-care and has osteoarthritis in addition to those medical problems mentioned earlier.

3. A 66-year-old man with known metastatic prostate cancer (stage D3) that was diagnosed 6 years prior to admission, is admitted to the hospital for C and T spinal cord compression. He is not a surgical candidate despite severe back pain, urinary incontinence, and lower extremity weakness and numbness. Despite radiation therapy, he requires a morphine elixir and fentanyl patches for pain. He is unable to transfer from his bed to a chair without pain. The cancer is resistant to hormonal treatments offered by urology specialists. His medical history also includes diabetes, asthma, and diverticulitis. He is admitted with a 1-week history of burning sensations from ankles to waist, without incontinence or gait disturbance. The testing of other biopsy specimens was nondiagnostic.

4. A 71-year-old man is admitted for nausea, vomiting, fever, and hip pain. He had experienced stage D2 prostate cancer that had been treated with a radical prostatectomy 6 years prior to hospital admission. He had had an elevated prostate-specific antigen level 4 years ago, and 2 years ago had experienced fever, anorexia, and hip, leg, and back pain. A bone scan demonstrated diffuse bony metastases. He was treated with hormonal therapy and experienced an improvement in his symptoms. Since that time, he has experienced fevers (temperature, up to 102.5°F), diaphoresis (three to five times daily), severe back pain, hip pain, and chronic analgesic use (ie, up to 20 tablets of acetaminophen with codeine daily). He also reports a recent 8-lb weight loss. His medical history is remarkable for pulmonary emboli 6 and 7 years prior to hospital admission, basal cell carcinoma, and diverticulitis.

5. A 78-year-old man with a 10-year history of multi-infarct dementia is admitted to the hospital after an episode of G1 bleeding and was awaiting nursing home placement. His medical problems are gout, gastric ulcers, hypertension, and chronic renal insufficiency.

6. A 31-year-old HIV-positive man who had experienced Pneumocystis pneumonia on four occasions in the past is admitted to the hospital for headache, nausea, and vomiting. A previous hospital admission demonstrated an EEG trace that was perhaps consistent with herpes encephalitis. The patient was admitted to the hospital for empiric IV acyclovir therapy until cerebrospinal fluid studies return. His CD4 count was < 50 cells/μL. Other history includes Mycobacterium avium intracellulare infection, abnormal results of liver function tests, asthma, and hypothyroidism.

7. A 64-year-old man is admitted to the hospital for the evaluation of possible spinal cord compression. Prostate cancer that had been diagnosed 2 years prior to hospital admission was treated with prostatectomy and radiotherapy. He had an orchietomy 1 year ago. The patient developed back pain, and a subsequent bone scan showed bony metastases. He received maximum dose of radiation therapy with some resulting relief of pain, but a follow-up bone scan showed disease progression. Pain is controlled by sustained-release morphine therapy. The patient is admitted with a 1-week history of burning sensations from ankles to waist, without incontinence or gait disturbance. The patient has lost 20 lb. His medical history is significant for type II diabetes and a history of heavy smoking.

8. A 35-year-old man who is HIV-positive, has a history of Pneumocystis carinii pneumonia, and a CD4 cell count of < 5 cells/μL was admitted for cough and shortness of breath. Bronchoscopy reveals P carinii pneumonia. The patient...
A 55-year-old woman with metastatic breast cancer is admitted to the hospital with GI bleeding. He was admitted to the hospital twice several months ago with esophageal variceal bleeding and was treated with sclerotherapy. On this hospital admission, he is admitted to the medical ICU where an endoscopy reveals a gastric ulcer. He was noted to have mental status changes on hospital admission, which persisted until his transfer to the general medicine wards. He is not currently a liver transplant candidate due to his continued alcohol abuse. His medical history includes hepatic encephalopathy, hepatitis B and C infections, thrombocytopenia, coagulopathy, and mitral regurgitation.

A 35-year-old woman with metastatic breast cancer is admitted to the hospital for a transfusion that is required for symptomatic anemia due to chemotherapy. The breast cancer was diagnosed 2 years ago, and the patient underwent a modified radical mastectomy of the left breast. The following year, she was found to have spinal cord metastases and was treated with surgery and radiotherapy. Several months ago, she was found to have lymph node and right hip metastases. Chemotherapy was initiated and was changed shortly before hospital admission. She has received two cycles of the new therapy. She was admitted to the hospital for shortness of breath and a hematocrit of 23.5 (WBC count, 0.4 cells/L, and his platelet count was 46,000 cells/L). The patient was found to be febrile on hospital admission. In addition to breast cancer, the patient’s medical history includes a recent exacerbation of herpes-zoster virus.

A 72-year-old man is admitted to the hospital through the emergency department for fevers. The patient has chronic lymphocytic leukemia, which was first diagnosed 4 years ago as an incidental finding on routine blood work. He has undergone cycles of chemotherapy with cyclophosphamide, doxorubicin, vincristine, and prednisone (last received shortly before hospital admission) with minimal response. During the past year, he has been hospitalized four times for fever, with and without neutropenia, without the etiology having been identified. He was scheduled for hospital admission for an RBC transfusion but reported 2 days early for a fever of 102°F and worsening fatigue. On hospital admission, his absolute neutrophil count was 920 cells/µL, his hemoglobin count was 6.6 cells/µL, and his platelet count was 46,000 cells/µL. In addition to his chronic lymphocytic leukemia, his medical history includes stage C prostate cancer (treated with a radical prostatectomy 4 years ago), diverticulosis, colon polyps, Raynaud’s syndrome, and congenital lung cysts.

A 68-year-old man is admitted to the rehabilitation service for therapy and education following a below-the-knee amputation of the right leg for diabetic ulcers. He recently spent 3 months in a nursing home rehabilitating but is still unable to perform his activities of daily living. He was noted to have abdominal distention and a partial bowel obstruction. Education was incomplete during his stay due to deafness and waning mental status. He is noted to be incontinent of urine and stool by the nursing staff. His medical history includes insulin-requiring diabetes, alcoholic cirrhosis, COPD, chronic renal insufficiency, atrial fibrillation, dilated cardiomyopathy, CHF, and peripheral vascular disease.

A 46-year-old woman with metastatic breast cancer is admitted to the hospital with fevers and chills due to infection around an indwelling catheter. Her breast cancer was diagnosed 5 years ago, and she has undergone a modified radical mastectomy, cyclophosphamide/doxorubicin/5-fluorouracil chemotherapy (six cycles), and radiation therapy to her tumor-positive axillary nodes. She was found to have metastases to her right humerus 2 years ago and experienced a pathologic left femur fracture shortly thereafter, which was treated with surgery and radiotherapy. Paclitaxel (Taxol; Bristol-Myers Squibb; Princeton, NJ) therapy was initiated 1 year ago, which ended shortly before this hospital admission. The patient’s medical history includes hypertension. His medical history also includes COPD, chronic atrial fibrillation, coronary artery disease (four-vessel), abdominal aortic aneurysm, hypertension, and embolic strokes without residual deficits.

A 67-year-old man with squamous cell cancer of the esophagus, which had been treated with two cycles of chemotherapy, is admitted to the hospital with pneumonia in the right middle lobe and right lower lobe. The patient also received local radiation therapy. His most recent chemotherapy was 1 week ago. His medical history also includes COPD, chronic atrial fibrillation, coronary artery disease (four-vessel), abdominal aortic aneurysm, hypertension, and embolic strokes without residual deficits.

An 83-year-old woman with hepatitis C cirrhosis presents with progressive ascites and pancytopenia that is thought to be secondary to splenic sequestration from portal hypertension. Her medical history is remarkable for hypertension and degenerative joint disease.

A 28-year-old man with AIDS and a CD4 count of 5 cells/µL is admitted to the hospital for bilateral eye pressure, sinus congestion with copious yellow mucous discharge, low-grade fever, and cough associated with emesis. His course has been complicated by early AIDS dementia, HIV-associated immune thrombocytopenic purpura, and thrush.

A 27-year-old HIV-positive man with a CD4 cell count of 39 cells/µL is admitted to the hospital after 4 days of confusion and bizarre behavior. He has some agitation and hallucinations. His family has noted diminished cognitive function over the previous several months. He denies alcohol or drug use. He has a history of oral thrush, P carinii pneumonia (2 years ago), and disseminated Kapo- si’s sarcoma, which had been treated in the past with multiple cycles of vincristine and bleomycin followed by radiation therapy. The bleomycin therapy was complicated by a decreased pulmonary diffusion capacity.

A 66-year-old man with multiple medical problems including atherosclerotic coronary artery disease, end-stage
renal disease receiving dialysis three times weekly, and diabetes presented to the emergency department with complaints of weakness, “feeling funny,” and shortness of breath. He was found to be hyperkalemic with a large right pleural effusion. Arterial blood gas measurements taken on admission to the hospital were remarkable for the following: pH, 7.36; PaCO₂, 44 mm Hg; and PaO₂, 45 mm Hg. He had had a hospital admission 1 year ago for a similar effusion. A thoracentesis at that time revealed abnormal cytology, suggesting an adenocarcinoma, but the patient was lost to follow-up. His medical history is remarkable for a four-vessel heart bypass surgery, severe CHF (ejection fraction, approximately 20%), anemia, thrombocytopenia, aortic valve replacement, atrial fibrillation, and cirrhosis.

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