

#### DEPARTMENT OF VETERANS AFFAIRS

## OFFICE OF INSPECTOR GENERAL

Office of Healthcare Inspections

VETERANS HEALTH ADMINISTRATION

Communication of Test
Results and Oncology
Scheduling Concerns at the
Beckley VA Medical Center
in West Virginia

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## **Executive Summary**

The VA Office of Inspector General (OIG) conducted a healthcare inspection at the Beckley VA Medical Center (facility) in West Virginia, at the request of Representative Carol Miller, to assess allegations that a patient received untimely and poor quality of care in the Emergency Department and Oncology Service. During the inspection, the OIG also reviewed the patient's primary care from early 2019 through spring 2019 and the facility's evaluation of the patient's care.

## **Synopsis of Patient Case Summary**

The underlined terms below are hyperlinks to a glossary. To return from the glossary, press and hold the "alt" and "left arrow" keys together.

The patient was in their 70s with multiple medical problems including a diagnosis of non-small cell lung cancer in spring 2017. The patient underwent radiation treatment and received ongoing follow-up care by the facility's oncologist. From early 2019 through spring 2019, the patient received care in the facility's Emergency Department for various complaints. In early spring 2019, the patient had a diagnosis of symptomatic anemia, was admitted to the facility, and received a blood transfusion. The patient's primary care provider noted and addressed the patient's anemia. The primary care provider referred the patient to the facility's oncologist for further evaluation. The patient underwent a bone marrow biopsy and was diagnosed with acute myeloid leukemia in summer 2019. Approximately three weeks later, the patient received care and started on oral chemotherapy at a non-VA cancer care center. A week later, the patient was admitted to the facility with community-acquired pneumonia. Due to the patient's worsening condition, the patient and family decided on comfort care and the patient died a few days later.

## **OIG Findings**

The OIG did not substantiate that the patient received untimely and poor quality of care in the facility's Emergency Department. The patient presented to the facility's Emergency Department six times between early 2019 and spring 2019 and during each visit, the patient was assessed and treated for the presenting complaints.

The patient received coordinated care between the primary care provider and other providers following Emergency Department visits, observational stays, and an acute care admission. However, on two occasions the OIG found no documented evidence that ordering primary care providers communicated abnormal and critical laboratory test results with the patient. While it appears that the failure to document communication of test results did not negatively affect this

<sup>&</sup>lt;sup>1</sup> The OIG uses the singular form of they (their) in this instance for privacy purposes.

patient's care, VHA has identified that the lack of timely follow-up of abnormal test results could contribute to poor patient outcomes and anxiety for patients and their families.<sup>2</sup>

In spring 2019, the patient's primary care provider entered an Oncology e-consult for anemia.<sup>3</sup> The oncologist responded that the patient would be seen sooner than the patient's scheduled follow-up appointment in five months; however, the oncologist did not enter a scheduling order. The following month, the primary care provider entered a second oncology e-consult after the patient's new diagnosis of <a href="hereditary hemochromatosis">hereditary hemochromatosis</a>. According to the oncologist, an appointment was then scheduled for the patient within a time frame appropriate for someone newly diagnosed with hereditary hemochromatosis. However, the timing was not in compliance with the Primary Care and Oncology Service Agreement of ensuring wait times of under 30 days for an appointment.<sup>4</sup> The OIG was unable to determine whether an earlier appointment or compliance with the return-to-clinic policy would have altered the patient's course; however, the failure to follow policy could lead to scheduling errors that could affect patient care. The oncologist followed recommended cancer surveillance for a patient with lung cancer, remained available to the primary care provider during the patient's anemia evaluation, and provided timely referrals for cancer care at another VA medical center and at a non-VA cancer care center.

The facility conducted clinical and quality reviews of the patient's care. Following the patient's death, the Risk Manager performed a routine review, which did not identify concerns. The OIG concluded that the facility conducted a comprehensive review of the patient's care from early 2019 through spring 2019.

The OIG made two recommendations related to primary care providers' communication and documentation of laboratory results and an oncologist's compliance with scheduling and ordering policies including the Primary Care and Oncology Service Agreement.

<sup>&</sup>lt;sup>2</sup> VHA Directive 1088, Communicating Test Results to Providers and Patients, October 7, 2015.

<sup>&</sup>lt;sup>3</sup> Anemia is a condition characterized by a decrease in hemoglobin. Symptoms, ranging from mild to severe, includes fatigue, weakness, shortness of breath, and chest pain. Mayo Clinic, *Anemia*, <a href="https://www.mayoclinic.org/diseases-conditions/anemia/symptoms-causes/syc-20351360?p=1">https://www.mayoclinic.org/diseases-conditions/anemia/symptoms-causes/syc-20351360?p=1</a> (The website was accessed on July 13,2020.) VHA Directive 1232(2), *Consult Processes and Procedures*, August 24,2016. An e-consult is clinical consultation entered electronically by a provider who is seeking an opinion, a dvice, and/or expertise from a specia list.

<sup>&</sup>lt;sup>4</sup> The patient experienced a wait time of 70 days from the initial consult, or 36 days from the second consult, to be seen by Oncology.

#### **Comments**

The Veterans Integrated Service Network and Facility Directors concurred with the findings and recommendations and provided acceptable action plans (see appendixes A and B for the Directors' comments). The OIG will follow up on the planned actions until they are completed.

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## **Abbreviations**

EHR electronic health record

OIG Office of Inspector General

VHA Veterans Health Administration

VISN Veterans Integrated Service Network



## Introduction

The underlined terms below are hyperlinks to a glossary. To return from the glossary, press and hold the "alt" and "left arrow" keys together.

The VA Office of Inspector General (OIG) conducted a healthcare inspection at the Beckley VA Medical Center (facility) in West Virginia, at the request of Representative Carol Miller, to assess allegations related to the timeliness and quality of care in the Emergency Department and Oncology Service, as well as the facility's review of a patient who died of acute myeloid leukemia.

## **Background**

The facility is part of Veterans Integrated Service Network (VISN) 5 and provides services to 11 counties in southern West Virginia. The facility is designated as Level 2, medium complexity, and has 30 general medical and surgical beds. The facility provides comprehensive health care in the areas of emergency care, acute and intensive care, primary care, and specialty care including oncology. From October 1, 2018, through September 30, 2019, the facility served 13,506 patients.

The facility provides limited outpatient oncology services. For diagnostic testing or treatment options not offered at the facility, patients are referred to another VA medical center or a non-VA cancer care center.<sup>3</sup> The facility's Primary Care and Oncology Service Agreement

<sup>&</sup>lt;sup>1</sup> VHA Office of Productivity, Efficiency, and Staffing. The VHA Facility Complexity Model categorizes medical facilities for purposes such as operational reporting, performance measurement, and research studies. Complexity levels include 1a, 1b, 1c, 2, or 3. Level 1a facilities are considered the most complex and Level 3 facilities are the least complex. <a href="http://opes.vssc.med.va.gov/Pages/Facility-Complexity-Model.aspx">http://opes.vssc.med.va.gov/Pages/Facility-Complexity-Model.aspx</a>. (The website was a coessed on May 27, 2020, and is an internal VA website not publicly a coessible.)

<sup>&</sup>lt;sup>2</sup> The facility has a 10-bed Emergency Department that operates 24 hours per day, seven days per week. The OIG considers the terms acute care and inpatient a dmissions interchangeable.

<sup>&</sup>lt;sup>3</sup> Facility Memorandum 517-2016-AC-15, *Outpatient Oncology Program*, August 1, 2016. Patients may receive care through a provider in their local community through the Veteran Community Care program depending on their health care needs or circumstances including travel distance and what is in the best interest of the patient. VHA Office of Community Care, Veteran Community Care – General Information Fact Sheet, <a href="https://www.va.gov/COMMUNITYCARE/docs/pubfiles/factsheets/VHA-FS\_MISSION-Act.pdf">https://www.va.gov/COMMUNITYCARE/docs/pubfiles/factsheets/VHA-FS\_MISSION-Act.pdf</a>. (The website was accessed on August 5, 2020, and is an internal VA website not publicly accessible.)

encourages the use of e-consults to decrease referral delays and states that the facility's oncologist will determine if a patient will be scheduled in the Oncology Clinic.<sup>4</sup>

#### **Definitions**

Non-small cell lung cancer is "a disease in which malignant (cancer) cells form in the tissues of the lung." Non-small cell lung cancer is one of two major classes of lung cancer, accounting for more than 80 percent of all lung cancers. Symptoms may include shortness of breath and a persistent cough. Common treatment options that may be used either alone or in combination include surgery, radiation therapy, and chemotherapy. The recommended post-treatment surveillance care for lung cancer includes either a history and physical with chest computed tomography scan every three to six months for the first three years, or a chest computed tomography scan every six months for the first two years and then annually thereafter.

Anemia is a condition characterized by a decrease in <a href="hemoglobin">hemoglobin</a>. Symptoms, ranging from mild to severe, includes fatigue, weakness, shortness of breath, and chest pain. The facility's identified range for a normal hemoglobin level is 13.5 grams per deciliter (g/dL) to 16.7 g/dL. A hemoglobin level between 8.0 g/dL and 13.5 g/dL is considered low and 16.7 g/dL to 18.0 g/dL is considered high. For patients with pre-existing heart disease, <a href="blood transfusions">blood transfusions</a> can be used to treat <a href="symptomatic anemia">symptomatic anemia</a> with a hemoglobin level of less than 8.0 g/dL. A <a href="complete blood count with differential">complete blood count with differential</a> can assist in identifying underlying causes of anemia.

Acute myeloid leukemia is a fast-growing blood cancer that prevents the body from fighting infections. Symptoms include fatigue and shortness of breath. Previous exposure to radiation

<sup>&</sup>lt;sup>4</sup> VHA Directive 1232(2), Consult Processes and Procedures, August 24, 2016. An e-consult is clinical consultation entered electronically by a provider who is seeking an opinion, a dvice, or expertise from a specialist. Acting Deputy Under Secretary for Health for Operations and Management Memo, Update to Workload Specifications for the Electronic Consult (E-Consult) Program, January 10, 2014. Should a patient's condition significantly change, a new e-consult is required.

<sup>&</sup>lt;sup>5</sup> National Cancer Institute, *Non-Small Cell Lung Cancer (PDQ®) – Health Professional Version*, <a href="https://www.cancer.gov/types/lung/hp/non-small-cell-lung-treatment-pdq">https://www.cancer.gov/types/lung/hp/non-small-cell-lung-treatment-pdq</a>. (The website was a ccessed on July 23, 2020.)

<sup>&</sup>lt;sup>6</sup> National Cancer Institute, *Non-Small Cell Lung Cancer (PDQ®) – Health Professional Version*, <a href="https://www.cancer.gov/types/lung/hp/non-small-cell-lung-treatment-pdq">https://www.cancer.gov/types/lung/hp/non-small-cell-lung-treatment-pdq</a>. (The website was accessed on July 23, 2020.) National Comprehensive Cancer Network Guidelines, *Non-Small Cell Lung Cancer*, <a href="https://www.nccn.org/professionals/physician\_gls/default.aspx">https://www.nccn.org/professionals/physician\_gls/default.aspx</a>. (The website was accessed on June 5, 2020.)

<sup>&</sup>lt;sup>7</sup> National Cancer Institute, *Patient instructions for non-small cell lung cancer treatment*. https://www.cancer.gov/types/lung/patient/non-small-cell-lung-treatment-pdq. (The website was accessed on June 10,2020.)

<sup>&</sup>lt;sup>8</sup> National Comprehensive Cancer Network Guidelines, *Non-Small Cell Lung Cancer*, <a href="https://www.nccn.org/professionals/physician\_gls/default.aspx">https://www.nccn.org/professionals/physician\_gls/default.aspx</a>. (The website was accessed on June 5, 2020.)

<sup>&</sup>lt;sup>9</sup> Mayo Clinic, *Anemia*. <a href="https://www.mayoclinic.org/diseases-conditions/anemia/symptoms-causes/syc-20351360?p=1">https://www.mayoclinic.org/diseases-conditions/anemia/symptoms-causes/syc-20351360?p=1</a>. (The website was accessed on July 13, 2020.) Pharmacotherapy Quick Guide, *Chapter 33: Anemia* 

<sup>10</sup> Pharmacotherapy Quick Guide, *Chapter 33: Anemia* 

treatment is considered a risk factor. 11 For older adults, responsiveness to treatment may be limited, with poor outcomes and low survival rates. 12

## **Allegations and Related Concerns**

On October 18, 2019, the OIG received a congressional referral from Representative Carol Miller alleging that a patient who died of acute myeloid leukemia received untimely and poor quality of care at the facility. The OIG referred the allegations to the facility for review on October 24, 2019. The OIG determined that the facility's response to inquiry was inadequate. To ensure a comprehensive review of the patient's care, the OIG opened a healthcare inspection on May 29, 2020, and assessed the care the patient received in the Emergency Department, Primary Care, and Oncology Service from early 2019 through spring 2019, as well as the facility's review of the patient's care.

## **Scope and Methodology**

The OIG initiated the inspection on May 29, 2020, and conducted a virtual site visit June 29, 2020, through July 9, 2020.

The OIG team interviewed the Facility Director; Chiefs of Staff, Quality Management, Emergency Department, Specialty Care, and Pathology; Peer Review Coordinator; Risk Manager; Emergency Department and primary care providers; oncologist; and other relevant staff.

The OIG team reviewed the identified patient's electronic health record (EHR), as well as relevant Veterans Health Administration (VHA) and facility policies related to Emergency Department and Primary Care Service responses to laboratory and test results, and cancer diagnosis, treatment, and surveillance. The OIG team reviewed the care the patient received at the facility from early 2019 through spring 2019.

In the absence of current VA or VHA policy, the OIG considered previous guidance to be in effect until superseded by an updated or recertified directive, handbook, or other policy document on the same or similar issue(s).

The OIG substantiates an allegation when the available evidence indicates that the alleged event or action more likely than not took place. The OIG does not substantiate an allegation when the available evidence indicates that the alleged event or action more likely than not did not take

<sup>&</sup>lt;sup>11</sup> Mayo Clinic, *Acute Myelogenous Leukemia*. <a href="https://www.mayoclinic.org/diseases-conditions/acute-myelogenous-leukemia/symptoms-causes/syc-20369109">https://www.mayoclinic.org/diseases-conditions/acute-myelogenous-leukemia/symptoms-causes/syc-20369109</a>. (The website was accessed on June 4, 2020.)

<sup>&</sup>lt;sup>12</sup> Sekeres, Mikkael A., Haematologica, *Treatment of older adults with acute myeloid leukemia: state of the art and current perspectives*, 2008, 93(12). An older adult is someone over the age of 60 years. The median age for a person diagnosed with a cute myeloid leukemia is 67 years.

place. The OIG is unable to determine whether an alleged event or action took place when there is insufficient evidence.

Oversight authority to review the programs and operations of VA medical facilities is authorized by the Inspector General Act of 1978, Pub. L. No. 95-452, §7, 92 Stat 1105, as amended (codified at 5 U.S.C. App. 3). The OIG reviews available evidence to determine whether reported concerns or allegations are valid within a specified scope and methodology of a healthcare inspection and, if so, to make recommendations to VA leaders on patient care issues. Findings and recommendations do not define a standard of care or establish legal liability.

The OIG conducted the inspection in accordance with *Quality Standards for Inspection and Evaluation* published by the Council of the Inspectors General on Integrity and Efficiency.

## **Patient Case Summary**

The patient was in their 70s with a history of <u>atrial fibrillation</u>, <u>chronic obstructive pulmonary disease</u>, tobacco use, and a pulmonary nodule and was diagnosed with non-small cell lung cancer (lung cancer) in spring 2017.<sup>13</sup> The patient elected to undergo radiation treatment and established care with the facility's oncologist in fall 2017. After completing radiation treatment, the patient was seen for follow-up in the Oncology Clinic on a regular basis. The follow-up visits included reviews of computed tomography scans of the chest and in-person visits with the oncologist every six months. The patient was seen in early 2018, as well as summer 2018, and the oncologist documented a decreased size in the left lung lower lobe <u>malignancy</u>.

On a day in early 2019 (day 1), the patient presented to the facility's Emergency Department with complaints of cough, congestion, and shortness of breath with chest tightness. An Emergency Department provider noted that the patient had symptoms "since Christmas" and that the patient was "not taking his nebs [nebulizer treatments] as recommended." During this visit, the Emergency Department provider ordered several laboratory studies including a complete blood count. The results of the complete blood count showed that the patient had a hemoglobin of 9.8 g/dL and a hematocrit of 28.4 percent. The Emergency Department provider noted in the EHR that the laboratory results were reviewed and were "unremarkable." The patient was diagnosed with an exacerbation of chronic obstructive pulmonary disease and started on an antibiotic, an oral steroid, and nebulized medication four times a day.

Approximately two weeks later (day 17), the patient was seen in the Emergency Department with complaints of cough, sinus congestion, and chest pain when breathing. An Emergency Department provider ordered laboratory studies including a complete blood count, which showed a further decrease in the patient's hemoglobin and hematocrit to 8.5 g/dL and 25 percent,

 $<sup>^{13}</sup>$  The OIG uses the singular form of they (their) in this instance for privacy purposes.

respectively. The Emergency Department provider did not comment on the results. The patient was treated for sinusitis and discharged home.

Two days later (day 19), the patient was seen for routine follow-up care in the Oncology Clinic. The oncologist noted that the patient had been seen and diagnosed with sinusitis. The oncologist documented the results of the patient's complete blood count, including the 8.5 g/dL hemoglobin and 25 percent hematocrit levels from the most recent Emergency Department visit, in the patient's EHR.

Approximately a month later (day 43), the patient was seen in the Emergency Department with complaints of a possible infection in the right leg for four days and shortness of breath with exertion. An Emergency Department provider noted that the patient had symptomatic anemia with a hemoglobin level of 5.7 g/dL and a hematocrit level of 16.8 percent and admitted the patient to the hospital for a blood transfusion.

To determine what was causing the patient's anemia, the inpatient provider consulted gastroenterology who saw the patient the following day. The gastroenterologist noted that the patient did not have any obvious source of anemia and recommended an endoscopy and a colonoscopy to look at possible gastrointestinal blood loss. The patient declined to have these studies and was discharged after the blood transfusions were completed.

Nine days after the Emergency Department visit (day 52), the primary care provider saw the patient, reviewed the patient's recent admission records that showed an anemia of unknown origin, and documented that the patient did not want an endoscopy or colonoscopy done at this time. The primary care provider ordered additional laboratory studies to evaluate possible causes of anemia, and submitted an Oncology e-consult. The oncologist documented that the patient was known to the Oncology Clinic and had an appointment scheduled in five months, but given the finding of anemia, the oncologist would see the patient for an earlier appointment.

Two days later (day 54), the patient presented to the Emergency Department with chest tightness and the Emergency Department provider noted heart monitor changes. The patient was observed for possible <u>acute coronary syndrome</u> and <u>pulmonary embolus</u>. The patient was discharged to home the next day once diagnostic tests were negative.<sup>14</sup>

Two weeks after discharge, on day 69, the primary care provider saw the patient as a follow-up to the patient's observational stay and ordered <u>iron studies</u>. The patient's hemoglobin and hematocrit levels were noted to be 8.3 g/dl and 24.9 percent, respectively. A physician assistant ordered additional laboratory tests. Four days later (day 73), laboratory staff called the physician assistant and reported that the patient's hemoglobin level was critical at 7.9 g/dL.

<sup>&</sup>lt;sup>14</sup> VHA Directive 1101.05(2), *Emergency Medicine*, September 2, 2016. VHA defines an observation patient as a medical, surgical, or mental health patient who requires monitoring or short-term treatment with a length of stay not to exceed 47 hours and 59 minutes.

The patient was seen in the Emergency Department on day 86, approximately two weeks following the primary care appointment, and received a blood transfusion. The following day the primary care provider called the patient for follow-up to the recent blood transfusion and discussed a new diagnosis of <a href="hereditary hemochromatosis">hereditary hemochromatosis</a>. The primary care provider ordered a <a href="flow cytometry">flow cytometry</a> test and submitted another Oncology e-consult. The results of the flow cytometry test were negative for abnormal cells. In response to this e-consult, the oncologist scheduled the patient to be seen on day 122.

Approximately one week after the primary care follow-up, on day 95, the primary care provider entered a cardiology consult for an evaluation of the patient. About two weeks later (day 110), a cardiologist met with the patient and noted that the patient's last hemoglobin level was in the "mid-9 range" and that the patient "becomes easily winded with minimal activity." The cardiologist ordered laboratory tests.

Nine days later (day 119), the patient was seen in the Emergency Department with shortness of breath and laboratory results showed a hemoglobin level of 6.6 g/dL and a hematocrit level of 20.1 percent. The patient received a blood transfusion prior to being discharged home.

Three days after discharge, the oncologist saw the patient and reviewed the laboratory studies, which now showed <u>myeloblasts</u> (blast cells). The oncologist discussed with the patient that the results were highly suspicious for an acute leukemia and recommended that the patient get a <u>bone marrow biopsy</u> at another VA medical center. The patient had a bone marrow biopsy eight days later, on day 130, and was diagnosed with acute myeloid leukemia the following week.

About three weeks later, on day 157, the oncologist saw the patient for "low hemoglobin and borderline <u>platelets</u>." The oncologist recommended that the patient receive a blood transfusion the following day. Three days later, the patient was seen at a non-VA cancer care center and prescribed oral chemotherapy.

The following week on day 168, the patient was admitted to the facility with <u>community-acquired pneumonia</u> and started on antibiotics as well as oxygen therapy. The patient was discharged home three days later but advised to return to the Emergency Department later that day because of a positive blood culture. The patient was readmitted to the facility the next day. Due to the patient's worsening condition, the patient and the family changed the patient's status to <u>Do Not Resuscitate</u> and <u>Do Not Intubate</u>, started the patient on comfort care, and the patient died on day 173.

## **Inspection Results**

# 1. Allegation: Untimely and Poor Quality of Care in the Emergency Department

The OIG did not substantiate that the patient received untimely and poor quality of care in the facility's Emergency Department from early 2019 through spring 2019.

VHA requires that all EHR documentation be accurate, reference the reason for the visit, contain relevant history, and be able to provide for continuity of care. <sup>15</sup> VHA also requires that an ordering provider receive notification of test results to allow for appropriate clinical action and communication to the patient. <sup>16</sup> VHA recognizes that in acute or emergency settings, the patient's condition may change rapidly or require repetitive testing; therefore, providers in those settings are not required to communicate each individual test result to the patient. <sup>17</sup>

A critical laboratory value requires that laboratory personnel notify the ordering provider and document that notification in the patient's EHR. <sup>18</sup> The facility defines a critical laboratory value for hemoglobin as 8 g/dL and lower, or 18 g/dL and higher. <sup>19</sup>

The patient was seen in the facility's Emergency Department six times from early 2019 to spring 2019. During each visit, the patient was assessed and treated for the presenting complaints. Emergency Department providers documented the patient's past medical history and ordered diagnostic and laboratory tests relevant to the patient's presenting complaints. The OIG found that Emergency Department providers discussed test results and the treatment plan with the patient at each visit. The OIG also found that when the patient's hemoglobin level became critical (below 8 g/dL), laboratory personnel notified the ordering provider and documented the notification in the patient's EHR.

The OIG concluded that the patient received timely and appropriate care in the facility's Emergency Department from early 2019 through spring 2019.

## 2. Concern: Timeliness and Quality of Care in Primary Care

The OIG reviewed the patient's primary care provided between early 2019 and spring 2019 and found evidence of coordination between the primary care provider and other providers following Emergency Department visits, observational stays, and an acute care admission. However, on

<sup>&</sup>lt;sup>15</sup> VHA Handbook 1907.01, Health Information Management and Health Records, March 19, 2015.

<sup>&</sup>lt;sup>16</sup> VHA Directive 1101.05(2).

<sup>&</sup>lt;sup>17</sup> VHA Directive 1088, Communicating Test Results to Providers and Patients, October 7, 2015.

<sup>&</sup>lt;sup>18</sup> Facility Policy, 31 Notification of Critical Values, July 10, 2017.

<sup>&</sup>lt;sup>19</sup> Facility Document, Critical Values List, September 6, 2013.

two occasions, the OIG noted that ordering primary care providers did not document patient communication of an abnormal and a critical test result.

VHA states that care coordination should take place when a patient is discharged from the hospital or when a patient is receiving specialty care services. <sup>20</sup> VHA also states that, in general, test results are communicated to patients within seven calendar days for results requiring action and 14 days for those that do not require any action. <sup>21</sup> The ordering provider or designee, is responsible for notifying patients of test results and documenting the notification in patient's EHRs.

Between early 2019 and spring 2019, the patient had one acute care admission and two observational stays.<sup>22</sup> Following these stays, as well as when the patient declined admission, the patient received either a telephone call or was seen for follow-up care in the Primary Care Clinic.

On day 69, the primary care provider met with the patient for a follow-up visit and ordered various laboratory tests including a check of the patient's hemoglobin level. The OIG found no documented evidence that the primary care provider discussed the patient's low, but not critical, hemoglobin level of 8.3 g/dL. Four days later on day 73, the OIG found that a physician assistant ordered laboratory tests including a check of the patient's hemoglobin level but could not find supporting documentation as to why the physician assistant entered this order. The OIG also found no documented evidence that the physician assistant discussed the results of the laboratory tests with the patient including a critical hemoglobin level of 7.9 g/dL or took action to address this critical test result.

The facility's Primary Care and Oncology Service Agreement outlines that the consult process is the preferred method of communication between providers and that "the Oncologist will determine if the consult can be completed electronically ([e]-consult) without the need for an actual clinic appointment." VHA requires facilities to maintain complete, timely, and accurate EHRs and holds the provider delivering care responsible for the documentation.<sup>23</sup>

As noted above, the primary care provider entered an Oncology e-consult due to the patient's recent admission for symptomatic anemia on day 52. On day 87, the primary care provider called the patient for follow-up to the recent blood transfusion and discussed a new diagnosis of hereditary hemochromatosis. The primary care provider entered a second Oncology e-consult for the patient's anemia and hereditary hemochromatosis. The patient was seen by the oncologist on day 122.

<sup>&</sup>lt;sup>20</sup> VHA Handbook 1101.10, Patient Aligned Care Team (PACT) Handbook, February 5, 2014.

<sup>&</sup>lt;sup>21</sup> VHA Directive 1088.

 $<sup>^{22}</sup>$  VHA Directive 1101.05(2). The patient had one in patient a dmission (March 10–12, 2019) and two observational stays (March 21–22 and May 25–26, 2019).

<sup>&</sup>lt;sup>23</sup> VHA Handbook 1907.01.

The OIG concluded that the patient's care was coordinated between the primary care provider and other providers following Emergency Department, observational stays, and an acute care admission. The primary care provider ordered laboratory tests and consulted with Oncology as needed. However, the OIG did not find documented evidence that the primary care provider discussed the day 69 abnormal test results or that the physician assistant communicated the day 73 critical laboratory results to the patient. The OIG also did not find documented evidence of why laboratory tests were ordered by the physician assistant or actions taken to address the critical test result. While it appears that the failure to document communication of test results did not negatively affect this patient's care, VHA requires such action to avoid delays or gaps in care. According to VHA policy, the "lack of timely follow-up of abnormal results has been identified as a contributor to poor outcomes and can be a source of considerable anxiety to patients and families." <sup>24</sup>

## 3. Allegation: Untimely and Poor Quality of Care by Oncology Services

The OIG substantiated that the oncologist did not schedule an appointment as planned after receiving a consult from the primary care provider asking to evaluate the patient's anemia. However, an appointment was scheduled after the primary care provider submitted a second consult approximately four weeks later. In addition, the OIG found that the oncologist did not use a Return to Clinic order to schedule the patient's appointments. The OIG was unable to determine whether an earlier appointment would have altered the patient's course.

VHA specifies that specialty care providers (oncologists) collaborate with patients' primary care providers, but do not assume total care of a patient.<sup>25</sup> The facility's consult policy states that providers should request scheduling of appointments through an order.<sup>26</sup> The Primary Care and Oncology Service Agreement states that consults that require a clinic appointment will be monitored to ensure that the patient's wait time is under 30 days. The facility monitors consult activity and discusses weekly those consults that are not meeting VHA's required standards. Between October 1, 2018, and September 30, 2019, the facility reported an average of 15 days from when a consult is entered until the consult is completed.

VHA requires that requests for scheduled appointments come through the EHR consult package as a Return to Clinic order.<sup>27</sup> A VA memorandum required the standardization and implementation of the national Return to Clinic process to prevent most scheduling errors.<sup>28</sup>

<sup>&</sup>lt;sup>24</sup> VHA Directive 1088.

<sup>&</sup>lt;sup>25</sup> VHA Handbook 1101.10.

<sup>&</sup>lt;sup>26</sup> Facility Memorandum 517-2017-11-26, Consultation/Specialty Care Referral Policy, August 2017.

<sup>&</sup>lt;sup>27</sup> VHA Directive 1230, Outpatient Scheduling Procedures, July 15, 2016, a mended July 12, 2019.

<sup>&</sup>lt;sup>28</sup> 10N Memorandum, Deployment of National Return To Clinic Order, December 7, 2017.

On day 19, the patient was seen for a routine follow-up visit in the Oncology Clinic and was scheduled for another routine follow-up appointment six months later. The primary care provider entered the initial Oncology e-consult on day 52. The following day, the oncologist responded that the patient would be seen earlier. Despite this response, the oncologist told the OIG that an earlier appointment was not entered and could not explain why. The primary care provider entered the second e-consult on day 86. A day later, in response, the oncologist entered an order for the patient to be seen on day 122. Based on the second e-consult identifying hereditary hemochromatosis, the oncologist told the OIG that the patient's follow-up appointment should and did occur within four to six weeks. The OIG determined that the oncologist did not comply with the Service Agreement with Primary Care. Although the patient was seen within the oncologist's recommended time frame of four to six weeks, the patient waited beyond the Service Agreement's time frame of 30 days.<sup>29</sup>

During the day 122 appointment, the oncologist reviewed the patient's laboratory test results from day 110, which indicated the initial presence of 20 percent blast cells, suspicious for leukemia. The same day, the oncologist referred the patient to another VA medical center for a bone marrow biopsy, which was completed on day 130. One week later (day 137), an oncologist from the other VA medical center told the patient the results of the bone marrow biopsy and the diagnosis of acute myeloid leukemia. The patient preferred to receive care closer to home and was referred to a non-VA cancer care center.

The OIG found that the oncologist did not comply with VHA policy by not entering the required Return to Clinic orders after both Oncology appointments and in response to the day 86 consult to schedule an appointment for day 122. The Chief of Staff told the OIG that the facility follows VHA guidelines for scheduling appointments and that it is "preferred that a Provider enter a Return to Clinic order instead of providing the scheduler with scheduling instructions." Although this patient was scheduled for follow-up appointments, the failure to comply with policy could lead to scheduling errors.

The OIG concluded that the oncologist followed recommended cancer surveillance for the patient's lung cancer, remained available to the primary care provider as a consultant in the evaluation of the patient's anemia, and provided timely referral for cancer care at another VA medical center and at the non-VA cancer care center. The OIG noted that the oncologist did not comply with the Primary Care and Oncology Service Agreement by scheduling a clinic appointment within 30 days of either consult. The OIG was unable to determine whether an earlier appointment would have altered the patient's course. The oncologist also did not comply with VHA's Return to Clinic ordering process. Although the patient had follow-up appointments scheduled, failure to comply with policy could lead to scheduling errors.

<sup>&</sup>lt;sup>29</sup> The patient experienced a wait time of 70 days from the initial consult, or 36 days from the second consult, to be seen by Oncology.

## 4. Concern: Facility's Review of the Patient's Care

The OIG determined that the facility conducted clinical and quality reviews of the patient's care.

VHA provides various avenues for facility leaders and quality managers to review patient care, including peer review for quality management (peer review) and focused clinical care review (clinical care review). A peer review is a confidential, nonpunitive focused review of the care provided to a patient by an individual clinician to determine if their decisions and actions met the standard of care.<sup>30</sup> The goal of a peer review is to identify opportunities for improving the quality of care. A clinical care review is a retrospective, comprehensive management review of a specific period used to determine what, if any, future actions will be taken against an identified clinician.<sup>31</sup>

Following the patient's death, the Risk Manager conducted a routine review of the patient's care.<sup>32</sup> The Risk Manager told the OIG that the results of the initial review did not trigger concerns about the care provided to the patient, so no further internal reviews were initiated at that time.

#### Peer Review

In November 2019, the facility's Chief of Quality Management received notification from the OIG about a hotline complaint regarding the patient. The Chief of Quality Management and the Risk Manager reviewed the patient's care. In February and March 2020, the Risk Manager initiated peer reviews on the relevant providers.

#### Clinical Care Review

Following the OIG request for a review of the complaint, the acting Chief of Staff completed a clinical care review of the patient's care in the Emergency Department and Oncology Clinic. The acting Chief of Staff noted in the review that the patient was seen in the Emergency Department during two months in early 2019. During both visits, the patient had laboratory tests completed and the results showed that the patient's hemoglobin level dropped from 15.7 g/dL in late 2018 to 9.8 g/dL in early 2019, and to 8.5 g/dL a month later. Although the patient's hemoglobin consistently dropped, it did not reach the facility's identified critical laboratory value of 8 g/dL.

On day 19, the patient was seen in the Oncology Clinic. The acting Chief of Staff documented on the clinical care review that the oncologist did not document a review of the patient's recent laboratory work, or that the patient had "significant anemia and possibly <u>smoldering myeloma</u>."

<sup>&</sup>lt;sup>30</sup> VHA Directive 1190, *Peer Review for Quality Management*, November 21, 2018.

<sup>&</sup>lt;sup>31</sup> VHA Directive 1190.

<sup>&</sup>lt;sup>32</sup> The Risk Manager told the OIG that one of a risk manager's responsibilities is to review all in-hospital deaths, and that this patient's review focused on various information including the patient's age, resuscitation status, date and time of a dmission, date and time of expiration, and hospice in volvement.

During an interview with the OIG, the acting Chief of Staff clarified that by looking at the laboratory studies the patient may have had smoldering myeloma, but noted that the assessment was based on knowing the entirety of the patient's case and not just what was presented at the time care was provided.

The OIG concluded that the facility conducted a comprehensive review of the patient's care from early 2019 through spring 2019. The clinical care review identified that while the patient's hemoglobin consistently dropped in early 2019, the patient's hemoglobin level did not meet the critical laboratory value criteria. Although the oncologist failed to mention the patient's consistent drop in hemoglobin levels and anemia, the oncologist would not likely conclude that the patient had a smoldering myeloma based on the patient's presenting information from early 2019.

## Conclusion

The OIG did not substantiate that the patient received untimely and poor quality of care in the facility's Emergency Department. During each visit the patient was assessed and treated for the presenting complaints.

On two occasions, the OIG noted that ordering primary care providers did not document patient communication of an abnormal and a critical test result. While it appears that the failure to document communication of test results did not negatively affect this patient's care, VHA has identified that the lack of timely follow-up of abnormal test results could contribute to poor patient outcomes and anxiety to the patient and families.

The OIG substantiated that the oncologist did not comply with the Primary Care and Oncology Service Agreement of ensuring wait times of under 30 days for an appointment. The oncologist did not schedule an appointment as planned after receiving the first consult from the primary care provider to evaluate the patient's anemia. However, the oncologist did schedule an appointment after a second consult was entered. The OIG was unable to determine whether an earlier appointment would have altered the patient's course. The OIG also noted that the oncologist did not comply with the Return to Clinic policy, which could cause scheduling errors.

The facility conducted clinical and quality reviews of the patient's care. Following the patient's death, the risk manager performed a routine review which did not identify concerns. After the OIG inquiry, the facility conducted peer reviews and a clinical care review related to the patient's care. The OIG concluded that the facility conducted a comprehensive review of the patient's care from early 2019 through spring 2019.

## Recommendations 1-2

- 1. The Beckley VA Medical Center Director ensures that primary care providers comply with communicating laboratory test results to patients and documenting the discussion in accordance with Veterans Health Administration policy.
- 2. The Beckley VA Medical Center Director ensures that the oncologist complies with facility scheduling and ordering policies including the Primary Care and Oncology Service Agreement.

## **Appendix A: VISN Director Memorandum**

#### **Department of Veterans Affairs Memorandum**

Date: December 21, 2020

To:

From: Director, VA Capitol Health Care Network (10N05)

Subj: Healthcare Inspection—Communication of Test Results and Oncology Scheduling Concerns at

the Beckley VA Medical Center in West Virginia

Director, Office of Healthcare Inspections (54HL08)

Director, GAO/OIG Accountability Liaison Office (VHA 10EG GOAL Action)

- I have reviewed and concur with the findings and recommendations in the Office of Inspector General's (OIG's) draft report entitled Communication of Test Results and Oncology Scheduling Concerns at the Beckley VA Medical Center in West Virginia.
- 2. Furthermore, I have reviewed and concur with the Medical Center Director's responses and that implementation of actions remain in progress.
- 3. Thank you for this opportunity to focus on continuous performance improvement. If you have any questions, please feel free to contact the VISN 5 Office at 410-691-1131.

(Original signed by:)

Robert M. Walton, FACHE

## **Appendix B: Facility Director Memorandum**

#### **Department of Veterans Affairs Memorandum**

Date: December 17, 2020

From: Director, Beckley VA Medical Center (517/00)

 ${\bf Subj:} \quad {\bf Healthcare\ Inspection--Communication\ of\ Test\ Results\ and\ Oncology\ Scheduling\ Concerns\ at}$ 

the Beckley VA Medical Center in West Virginia

To: Director, VA Capitol Health Care Network (10N05)

1. I have reviewed and concur with the findings and recommendations in the Office of Inspector General's (OIG's) draft report entitled Communication of Test Results and Oncology Scheduling Concerns at the Beckley VA Medical Center in Beckley, West Virginia.

- 2. Attached are the facility responses to the two (2) recommendations including actions to correct the identified opportunities for improvement.
- 3. Please feel free to contact myself or our facility Quality Management Chief with any questions.

(Original signed by:)

Desmond J. McMullan Medical Center Director Beckley VAMC

## **Facility Director Response**

#### **Recommendation 1**

The Beckley VA Medical Center Director ensures that primary care providers comply with communicating laboratory test results to patients and documenting the discussion in accordance with Veterans Health Administration policy.

Concur.

Target date for completion: July 2021

#### **Director Comments**

Upon receipt of recommendations, a meeting was held on 12/7/20 with the Chief of Staff, the Primary Care Service Line Chief, the Specialty Care Service Line Chief, the Quality Management Chief, the Risk Manager, the Clinical Care Coordinator of Specialty Care. A plan was discussed to move forward with a request that each of the Primary Care Service Line Providers review the "Communication of Test Results" policy. Additionally, an audit will be completed regarding compliance with the "Communication of Test Results" policy regarding patients within Primary Care. The Primary Care audit will consist of 50 medical records with lab results reviewed monthly. The numerator will be the number of records compliant and the denominator will be the number of records reviewed. The acceptable compliance rate will be set at 90% for six consecutive months. These audit results will be collected by the Primary Care Service Line Chief. The audits will be reported monthly to the Quality, Safety & Value Council and then to Executive Leadership Board.

#### **Recommendation 2**

The Beckley VA Medical Center Director ensures that the oncologist complies with facility scheduling and ordering policies including the Primary Care and Oncology Service Agreement.

Concur.

Target date for completion: July 2021

#### **Director Comments**

Upon receipt of recommendations, a meeting was held on 12/7/20 with the Chief of Staff, the Primary Care Service Line Chief, the Specialty Care Service Line Chief, the Quality Management Chief, the Risk Manager, and the Clinical Care Coordinator of Specialty Care. A plan was discussed to move forward with a request that each of the Primary Care Service Line Providers along with the Oncology Provider review the Oncology, Hematology & Outpatient Infusion Clinic Coordination Agreement. Additionally, an audit will be completed regarding compliance with the Oncology, Hematology & Outpatient Infusion Clinic Coordination

Agreement by scheduling a clinic appointment within 30 days of consult and compliance with using the return to clinic order when scheduling appointments. The Oncology Clinical Consult audit will consist of 100% percent reviews of all Oncology, Hematology & Outpatient Infusion Clinic consults. The numerator will be the number of records compliant and the denominator will be the number of records reviewed. The acceptable compliance rate will be set at 90% for six consecutive months. These audit results will be collected by the Primary Care Service Line Chief. The audits will be reported monthly to the Quality, Safety & Value Council and then to the Executive Leadership Board.

## **Glossary**

To go back, press "alt" and "left arrow" keys.

**acute coronary syndrome.** "[A]n umbrella term for situations where the blood supplied to the heart muscle is suddenly blocked."<sup>33</sup>

**atrial fibrillation.** An irregular, rapid heart rate when the heart's two upper chambers beat out of coordination with the heart's two lower chambers.<sup>34</sup>

**blood transfusion.** A procedure in which the blood of a donor is transferred to a patient, through their vein. It may be used to replace blood lost or when an illness prevents the body from properly making blood.<sup>35</sup>

**bone marrow biopsy.** A procedure where a needle is inserted into the bone to obtain a sample of bone marrow for determining if the body has a problem making healthy blood cells. <sup>36</sup>

**chronic obstructive pulmonary disease**. "A chronic inflammatory lung disease that causes obstructed airflow from the lungs."<sup>37</sup>

**colonoscopy.** A medical procedure using "a long, flexible tube (colonoscope) [inserted] into the rectum" with a camera to view possible changes in the large intestine and rectum.<sup>38</sup>

**community-acquired pneumonia.** "A breathing (respiratory) condition in which there is an infection of the lung...in people who have not recently been in the hospital or another health care facility such as a nursing home or [rehabilitation] facility."<sup>39</sup>

<sup>&</sup>lt;sup>33</sup> American Heath Association, *Acute Coronary Syndrome*. <a href="https://www.heart.org/en/health-topics/heart-attack/about-heart-attacks/acute-coronary-syndrome">https://www.heart.org/en/health-topics/heart-attacks/acute-coronary-syndrome</a>. (The website was accessed on June 9, 2020.)

<sup>&</sup>lt;sup>34</sup> Mayo Clinic, *Atrial Fibrillation*. <a href="https://www.mayoclinic.org/diseases-conditions/atrial-fibrillation/symptoms-causes/syc-20350624">https://www.mayoclinic.org/diseases-conditions/atrial-fibrillation/symptoms-causes/syc-20350624</a>. (The website was accessed on June 9, 2020.)

<sup>&</sup>lt;sup>35</sup> Mayo Clinic, *Blood Transfusion*. <a href="https://www.mayoclinic.org/tests-procedures/blood-transfusion/about/pac-20385168">https://www.mayoclinic.org/tests-procedures/blood-transfusion/about/pac-20385168</a>. (The website was accessed on August 18, 2020.)

<sup>&</sup>lt;sup>36</sup> John Hopkins Medicine, *Bone Marrow Biopsy*. <a href="https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/bone-marrow-">https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/bone-marrow-</a>

biopsy#:~:text=A%20bone%20marrow%20biopsy%20involves,needle%20inserted%20into%20the%20bone. (The website was a ccessed on June 4, 2020.)

<sup>&</sup>lt;sup>37</sup> Mayo Clinic, *Chronic Obstructive Pulmonary Disease*. <a href="https://www.mayoclinic.org/diseases-conditions/copd/symptoms-causes/syc-20353679">https://www.mayoclinic.org/diseases-conditions/copd/symptoms-causes/syc-20353679</a> (The website was accessed on June 10, 2020.)

 $<sup>{}^{38}\,</sup>Mayo\,Clinic, {\it Colonoscopy.} \\ \underline{https://www.mayoclinic.org/tests-procedures/colonoscopy/about/pac-20393569}. (This website was accessed on August 18, 2020.)$ 

<sup>&</sup>lt;sup>39</sup> MedlinePlus, *Community Acquired Pneumonia*. <a href="https://medlineplus.gov/ency/article/000145.htm">https://medlineplus.gov/ency/article/000145.htm</a>. (The website was accessed on August 18, 2020.)

**complete blood count with differential.** A blood test used to measure different parts of blood and can detect a wide range of disorders, including anemia, infection, and leukemia. The test includes red blood cells, white blood cells, platelets, hemoglobin, and hematocrit.<sup>40</sup>

**computed tomography (CT) scan.** A scan that uses a series of x-rays to create images of bones, blood vessels, and soft tissues to diagnose disease or injury.<sup>41</sup>

**Do Not Resuscitate.** An order that tells medical staff "not to do cardiopulmonary resuscitation (CPR) if [the patient's] heart or breathing stops." <sup>42</sup>

**Do Not Intubate.** An order that tells medical staff "that [a patient] do[es] not wish to have a breathing tube inserted and [put] on a ventilator (breathing machine)."<sup>43</sup>

**endoscopy.** A medical procedure using a "thin, tube-like instrument" to examine the esophagus and stomach and "remove tissue to be checked under a microscope for signs of disease."<sup>44</sup>

**flow cytometry.** A blood test that uses an instrument called a flow cytometer to measure "the number and percentage of cells in a blood sample and cell characteristics such as size, shape and the presence of biomarkers on the cell surface." This test can be used to detect abnormal cells present in lymphomas and leukemias.<sup>45</sup>

**gastroenterologist.** "A physician with dedicated training management of diseases of the gastrointestinal tract and liver." <sup>46</sup>

**gastroenterology.** "A branch of medicine concerned with the structure, functions, diseases, and pathology of the stomach and intestines."<sup>47</sup>

<sup>&</sup>lt;sup>40</sup> MedlinePlus, *Complete Blood Count*. <a href="http://www.medlineplus.gov/lab-tests/complete-blood-count-cbc/">http://www.medlineplus.gov/lab-tests/complete-blood-count-cbc/</a>. (The website was accessed on June 4, 2020.)

<sup>&</sup>lt;sup>41</sup> Mayo Clinic, *CT scan*. <a href="https://www.mayoclinic.org/tests-procedures/ct-scan/about/pac-20393675">https://www.mayoclinic.org/tests-procedures/ct-scan/about/pac-20393675</a>. (The website was accessed on June 11, 2020.)

<sup>&</sup>lt;sup>42</sup> National Cancer Institute, *Planning the Transition to End-of-Life Care in Advanced Cancer*. https://www.cancer.gov/about-cancer/advanced-cancer/planning/end-of-life-pdq. (The website was accessed on August 18, 2020.)

<sup>&</sup>lt;sup>43</sup> National Cancer Institute, *Planning the Transition to End-of-Life Care in Advanced Cancer*. <a href="https://www.cancer.gov/about-cancer/advanced-cancer/planning/end-of-life-pdq">https://www.cancer.gov/about-cancer/advanced-cancer/planning/end-of-life-pdq</a>. (The website was accessed on August 18,2020.)

<sup>&</sup>lt;sup>44</sup> National Cancer Institute, *Endoscopy*. <a href="https://www.cancer.gov/publications/dictionaries/cancer-terms/def/endoscopy">https://www.cancer.gov/publications/dictionaries/cancer-terms/def/endoscopy</a>. (The website was accessed on June 10, 2020.)

<sup>&</sup>lt;sup>45</sup> Leukemia & Lymphoma Society, *Flow Cytometry*. <a href="https://www.lls.org/managing-your-cancer/lab-and-imaging-tests/blood-tests">https://www.lls.org/managing-your-cancer/lab-and-imaging-tests/blood-tests</a>. (The website was accessed on July 28, 2020.)

<sup>&</sup>lt;sup>46</sup> American College of Gastroenterology, *What is a Gastroenterologist?* <a href="https://gi.org/patients/gi-health-and-disease/what-is-a-gastroenterologist/">https://gi.org/patients/gi-health-and-disease/what-is-a-gastroenterologist/</a>. (The website was a ccessed on September 21, 2020.)

<sup>&</sup>lt;sup>47</sup> Merria m-Webster, *Gastroenterology*. <a href="https://www.merriam-webster.com/dictionary/gastroenterology">https://www.merriam-webster.com/dictionary/gastroenterology</a>. (The website was a ccessed on August 18, 2020.)

**gastrointestinal.** A part of the digestive system where "food and liquids travel through when they are swallowed, digested, absorbed, and leave the body." The digestive system includes the mouth, throat, stomach, small and large intestines, rectum, and anus.<sup>48</sup>

**hematocrit.** "The amount of whole blood that is made up of red blood cells." A complete blood count will measure the proportion of red blood cells which carry oxygen throughout the body. The presence of too few or too many red blood cells may be an indicator of certain diseases.<sup>49</sup>

**hemoglobin.** "A protein inside red blood cells that carries oxygen from the lungs to tissues and organs in the body and carries carbon dioxide back to the lungs." A complete blood count usually measures the amount of the protein in the blood to show how many red blood cells are in the blood.<sup>50</sup>

**hereditary hemochromatosis.** A genetic disorder causing iron build-up in the "skin, heart, liver, pancreas, pituitary gland, and joints" which can cause liver disease and other health problems, including damage to tissues and organs.<sup>51</sup>

**iron studies.** A blood test that measures iron levels in the body. An iron study can be used to "diagnose different types of anemia."<sup>52</sup>

malignancy. "the presence of cancerous cells that have the ability to spread to other sites in the body (metastasize) or to invade nearby (locally) and destroy tissues."<sup>53</sup>

**myeloblasts.** Produced in the bone marrow, myeloblasts (blasts cells) are immature blood cells that are not able to function properly, develop into leukemic white blood cells, and crowd out other healthy cells.<sup>54</sup>

<sup>&</sup>lt;sup>48</sup> National Cancer Institute, *Gastrointestinal*. <a href="https://www.cancer.gov/publications/dictionaries/cancer-terms/def/gastrointestinal-tract">https://www.cancer.gov/publications/dictionaries/cancer-terms/def/gastrointestinal-tract</a>. (The website was a coessed on June 10, 2020.)

<sup>&</sup>lt;sup>49</sup> National Cancer Institute, *Hematocrit*. <a href="https://www.cancer.gov/publications/dictionaries/cancer-terms/def/hematocrit">https://www.cancer.gov/publications/dictionaries/cancer-terms/def/hematocrit</a>. (The website was a coessed on June 4, 2020.) Mayo Clinic, Hematocrit. <a href="https://www.mayoclinic.org/tests-procedures/hematocrit/about/pac-20384728?p=1">https://www.mayoclinic.org/tests-procedures/hematocrit/about/pac-20384728?p=1</a>. (The website was a coessed on June 4, 2020.)

<sup>&</sup>lt;sup>50</sup> National Cancer Institute, *Hemoglobin*. <a href="https://www.cancer.gov/publications/dictionaries/cancer-terms/def/hemoglobin">https://www.cancer.gov/publications/dictionaries/cancer-terms/def/hemoglobin</a>. (The website was a ccessed on June 4, 2020.) MedlinePlus, Complete Blood Count. <a href="https://medlineplus.gov/lab-tests/complete-blood-count-cbc/">https://medlineplus.gov/lab-tests/complete-blood-count-cbc/</a>. (The website was accessed on June 4, 2020.)

<sup>&</sup>lt;sup>51</sup> Centers for Disease Control and Prevention, *Hereditary Hemochromatosis*. https://www.cdc.gov/genomics/disease/hemochromatosis.htm. (The website was accessed on June 10, 2020.)

<sup>&</sup>lt;sup>52</sup> MedlinePlus, *Iron Tests*. <a href="https://medlineplus.gov/lab-tests/iron-tests">https://medlineplus.gov/lab-tests/iron-tests</a>. (The website was accessed on August 19, 2020.)

<sup>&</sup>lt;sup>53</sup> MedlinePlus, *Malignancy*. <a href="https://medlineplus.gov/ency/article/002253.htm">https://medlineplus.gov/ency/article/002253.htm</a>. (The website was accessed on July 21,2020.)

<sup>&</sup>lt;sup>54</sup> Mayo Clinic, *Acute Myelogenous Leukemia*. <u>https://www.mayoclinic.org/diseases-conditions/acute-myelogenous-leukemia/symptoms-causes/syc-20369109</u>. (The website was a ccessed on June 4, 2020.)

**nebulizer.** "[A] small machine that turns liquid medicine into a mist" that can "deliver medicine with less effort than an inhaler."55

oncologist. A doctor who specializes in diagnosing and treating cancer.<sup>56</sup>

**oncology.** A branch of medicine focused on the prevention, diagnosis, treatment, and study of cancer.<sup>57</sup>

**platelet.** A piece of large cells in the bone marrow that help form blood clots or stop bleeding and heal wounds.<sup>58</sup>

**pulmonary embolus.** "[A] blockage in one of the pulmonary arteries in [the] lungs. In most cases [it] is caused by blood clots that travel to the lungs from deep veins in the legs or, rarely, from veins in other parts of the body."<sup>59</sup>

**sinusitis.** Occurs when the sinuses are inflamed, which can be caused by an infection, or another problem.<sup>60</sup>

**smoldering myeloma.** "Smoldering multiple myeloma (SMM) [or smoldering myeloma] is a precancerous form of myeloma, a cancer of plasma cells in the bone marrow." <sup>61</sup>

**symptomatic anemia.** "Anemia signs and symptoms vary depending on the cause," which could mask them. If symptoms occur, they may include fatigue, irregular heartbeats, shortness of breath, dizziness, and chest pain.<sup>62</sup>

<sup>&</sup>lt;sup>55</sup> MedlinePlus, *How to use a nebulizer*. <a href="https://medlineplus.gov/ency/patientinstructions/000006.htm">https://medlineplus.gov/ency/patientinstructions/000006.htm</a>. (The website was a ccessed on June 10, 2020.)

<sup>&</sup>lt;sup>56</sup> National Cancer Institute, *Oncologist*. <a href="https://www.cancer.gov/publications/dictionaries/cancer-terms/def/medical-oncologist">https://www.cancer.gov/publications/dictionaries/cancer-terms/def/medical-oncologist</a>. (The website was accessed on June 4, 2020.)

<sup>&</sup>lt;sup>57</sup> Merriam-Webster, *Definition of Oncology*. <a href="https://www.merriam-webster.com/dictionary/oncology">https://www.merriam-webster.com/dictionary/oncology</a>. (The website was accessed on June 4, 2020.)

<sup>&</sup>lt;sup>58</sup> National Cancer Institute, *Platelet*. <a href="https://www.cancer.gov/publications/dictionaries/cancer-terms/def/platelet">https://www.cancer.gov/publications/dictionaries/cancer-terms/def/platelet</a>. (The website was on accessed June 4, 2020.)

<sup>&</sup>lt;sup>59</sup> Mayo Clinic, *Pulmonary Embolism*. <a href="https://www.mayoclinic.org/diseases-conditions/pulmonary-embolism/symptoms-causes/syc-20354647">https://www.mayoclinic.org/diseases-conditions/pulmonary-embolism/symptoms-causes/syc-20354647</a>. (This website was accessed on August 18, 2020.)

<sup>&</sup>lt;sup>60</sup> MedlinePlus, Sinusitis. https://medlineplus.gov/sinusitis.html. (The website was accessed on June 10, 2020.)

<sup>&</sup>lt;sup>61</sup> University of Arkansas Medical Sciences, Winthrop P. Rockefeller Cancer Institute, *Smoldering Myeloma*. <a href="https://cancer.uams.edu/myeloma/myeloma-related-diseases/smoldering-myeloma/">https://cancer.uams.edu/myeloma/myeloma-related-diseases/smoldering-myeloma/</a>. (The website was accessed on August 18, 2020.)

<sup>&</sup>lt;sup>62</sup> Mayo Clinic, *Anemia*. <a href="https://www.mayoclinic.org/diseases-conditions/anemia/symptoms-causes/syc-20351360">https://www.mayoclinic.org/diseases-conditions/anemia/symptoms-causes/syc-20351360</a>. (The website was a coessed on July 13, 2020.)

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