



## Introduction/Background

Both the emergency medicine community and the oncology community recognize that cancer patients need specialized emergency care and are better served by professionals who are knowledgeable about their unique needs. Patients often relate stories of being told in their local emergency department (ED) to go to their cancer center for further treatment after emergent conditions have been excluded. Conversely, oncologists rarely have access to emergency departments with specific oncology expertise. Patients express the concern that emergency physicians in the community are not completely comfortable caring for complex oncology patients and lack of knowledge of their disease and treatment. Knowing of patients' prior experiences in these settings, oncologists are often hesitant to recommend to their patients in emergency departments with limited oncologic expertise.

Many oncologists who work in large centers are requesting urgent and emergent after-hours services by personnel who are trained in handling oncologic emergencies. With overcrowding and prolonged waits for treatment that characterize many of our nation's EDs, those with cancer and complex care needs, including immunocompromise, intractable pain, and end-of-life care, may best be served in regionalized emergency departments specializing in oncology care.

The numbers of cancer patients and survivors among the general population are increasing. The life expectancy of cancer patients has increased significantly in the last six decades. Comparative survival data from the MD Anderson Cancer Registry (the University of Texas MD Anderson Cancer Center, Houston), which was started in 1944, demonstrate a marked improvement in survival rates for most malignancies. Examples include breast cancer, the 10-year overall survival rate having increased from 25 % in 1944 to 76.5 % in 1995 for patients treated at MD Anderson. For prostate cancer, the most common malignancy in men, the 10-year survival rate increased from 8.5 % in 1944 to 82.5 % in 1995. Acute myeloid leukemia was simply fatal in 1944, with a median survival from diagnosis of 8 weeks and a 99 % mortality rate at 12 months, by 2004, the long-term survival rate had increased to over 25 %. Remission rates in acute myeloid leukemia patients under age 60 years have reached 65 % [1]. Thus, there are many cancer survivors seeking medical care in primary care offices and EDs around the country.

Several other factors have increased the population of oncology patients and survivors seeking acute care. In the last few years, more oncology patients have been receiving treatment as outpatients. Leukemia and stem cell transplant patients spend less time in the hospital and often receive the majority of their chemotherapy in outpatient treatment centers. These patients are no longer universally admitted to the hospital for neutropenia if there is no evidence of infection. Instead, they make frequent trips to the hospital for treatment and laboratory evaluations. Often, patients arrange temporary housing in the

area of the oncology treatment center. This practice has also increased the need for unscheduled acute care. Furthermore, cancer patients and survivors have a combination of medical problems that may or may not be related to their cancer history and a wide range of potential residual medical issues related to their prior disease and/or treatments. Meanwhile, oncology care is becoming increasingly specialized. Oncology practice is focusing on emerging treatments and targeted therapies. As more treatment options become available, more expertise is needed in each oncologic subspecialty. Along with the increasing treatment options, there are more potential side effects and treatments available for the supportive care of these patients.

Cancer patients not only suffer from complex medical problems related to their disease and therapy but also are particularly vulnerable emotionally. Patients suffering from a life-threatening illness often have stronger bonds with their medical providers that may be associated with higher expectations for care and an increased sensitivity to their care providers' words or actions; conversations can take on a greater meaning and become more emotionally charged than under normal circumstances [2]. Caring for patients with advanced cancer is stressful for clinicians, and discussing bad news often evokes strong emotional feelings. Not all physicians are formally trained for this difficult communication task. End-of-life talks are time-consuming and stressful in any environment, but this is compounded in the ED, where the cancer patient's needs must compete with the treatment demands of other patients. Unfortunately, evaluation in the ED often reveals progression of the underlying malignancy and may raise the topic of transition to palliative care. Most emergency physicians feel ill-equipped to have this discussion due to the brief nature of their relationship with the patient and lack of depth of understanding of the patient's disease, its progression, and possible therapeutic options. At the same time, the patient, faced with new knowledge about disease progression manifested by the symptomatology that has resulted in the emergency visit, may have multiple questions and a high level of anxiety. At this time, the patient is at high risk for feelings of abandonment [2], especially if the emergency physician is unable to answer questions or provide adequate reassurance that the patient's primary oncologist will be available to them in a timely fashion. Nursing staff may also be unprepared to care for patients who are actively dying and lack the skills to manage end-of-life symptoms.

Despite these needs, there are very few acute care facilities dedicated entirely to the care of cancer patients. MD Anderson and Memorial Sloan Kettering Cancer Center (New York) have such centers. Other institutions with a large percentage of oncology patients are developing resources to provide the specialized care these patients need and to mitigate the difficulties these patients can present to a busy ED. Some institutions are opening fully integrated cancer units within their EDs. They are examining ways to quickly recognize acutely ill oncology patients so that high-risk

patients are treated expeditiously [3], while maintaining an appropriate triage system so that other patients do not perceive oncology patients as receiving preferential treatment.

In this chapter, we describe several models for providing care for oncology patients in the emergency setting. The models range from EDs at large, dedicated cancer centers (MD Anderson and Memorial Sloan Kettering); to a cancer-dedicated emergency department alongside a general emergency department, with some shared resources (Asan Medical Center, Seoul, Korea); to a distributed model in which an oncology service provides support at general acute care facilities, often rural (Merseyside and Cheshire Cancer Network, England). We also describe a fully integrated oncology ED that is under development (the Arthur G. James Cancer Hospital and Richard J. Solove Research Institute (“The James”), Columbus, Ohio) to illustrate some of the pivotal issues of institutions embarking on this endeavor.

Common issues that are considered essential to all of these models include:

- Recognition and expeditious treatment of oncologic emergencies such as neutropenic fever, spinal cord compression, tumor lysis syndrome, and pulmonary embolism
- Appropriate management of pain for patients who are not opioid naïve
- Management of frequently needed procedures such as thoracentesis and paracentesis
- Early recognition and proper management of patients who have Do Not Resuscitate (DNR) orders or are near the end of life
- Knowledgeable management of complications of cancer treatment
- Proper communication regarding disease progression with the patient and oncologist
- Adequate support from end-of-life services such as palliative care and hospice
- Consistent and reliable method of communication with the patients’ oncologists
- Support for patients who are new to the institution and attracted by the cancer ED designation

Different models for providing emergency care to cancer patients are derived from the variable needs and characteristics of each practice, such as the prevalence of cancer types, the physical and administrative organization of the local oncology services, and the resources available.

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## MD Anderson Cancer Center

The Emergency Center at MD Anderson Cancer Center is dedicated exclusively to the care of cancer patients. It is located in the main hospital building and is designated a level III ED by

the Joint Commission and the Centers for Medicare and Medicaid Services. Ninety-eight percent of patients treated in MD Anderson’s ED have cancer or a cancer history. The ED has a large role in the inpatient services provided at MD Anderson. Thirty-nine percent of hospital admissions come through the ED [4].

However, MD Anderson did not open its doors with an ED in place. The ED developed gradually as a response to the needs for acute care for the large number of outpatients being treated at MD Anderson. Initially, urgent and emergent services were provided in an open ward. No doctors were assigned to the area, and when a patient requiring emergent care arrived, the patient’s physician was notified and sent to the ward to evaluate the patient. This situation was not optimal for acutely ill patients or for patients scheduled in the clinic, and the lack of individual patient rooms made it difficult to maintain patients’ privacy and confidentiality [5]. The system was also disruptive for oncologists, who already had full clinical schedules. Eventually, full-time physician coverage was established, initially provided by the Department of General Internal Medicine. In 1986, the ED was formally opened. Initially, it had 23 private rooms and provided care to approximately 14,000 patients per year. In 2007, the emergency center moved to its current expanded location. In 2011, MD Anderson established an academic Department of Emergency Medicine, the first such department dedicated entirely to oncologic emergency medical care, education, and research. The MD Anderson ED currently has 45 private rooms, a six-chair unit, and a two-chair triage bay. The ED is equipped with two resuscitation rooms in which critical care is provided to patients with high acuity that arrive from the clinics, walk-in or arrive by ambulance. The ED now sees over 24,000 patient visits annually. All of the patients have cancer or are cancer survivors, except for an occasional family member of a patient or an employee.

The ED is staffed with full-time faculty members, the majority of whom are board certified in internal medicine or emergency medicine. Some faculty members are board certified in surgery, pediatrics, or infectious disease, or palliative medicine. The physicians are faculty at the University of Texas and have similar academic obligations for research, administration, and teaching as other MD Anderson faculty members. The Department of Emergency Medicine recently initiated an oncologic emergency medicine fellowship, now in its third year. Mid-level providers are utilized in the ED but provide a relatively small portion of the care.

The department’s 19 faculty members provide round-the-clock coverage. Coverage ranges from two to six physicians with an additional mid-level provider at the busiest times. The ED employs approximately 75 registered nurses with a nurse-to-patient ratio of approximately 1 to 3.

Care and treatment decisions are made by the ED faculty. However, the oncologists do provide a call schedule, and there is frequent communication on an as-needed basis between the

ED physicians and primary oncologists. Oncologists do not routinely round in the ED unless they have admitted patients who are boarding there. The electronic medical record provides the full access to the patient's medical record. Oncologists can notify the ED staff of a patient's pending arrival with the addition of important clinical information by entering a note in the medical record. After patients are seen, a note is generated by the ED physicians notifying the primary oncologist that the patient was seen. If consultation is warranted, the oncologist is contacted by phone.

The average ED length of stay is just over 6 h for a non-admitted patient and over 9 h for an admitted patient. The ED admits 51 % of the patients presenting for treatment. Approximately 30 % of unique patients have hematologic tumors (leukemia or lymphoma) or have received stem cell transplantation, comprising 50.3 % of all patient visits [4]; the remainder have solid tumors.

Of all the patients visiting the ED in 2010, hematologic patients averaged 2.2 visits per patient, and solid-tumor patients averaged 1.8. Of these patients, 12 % had four visits or more, with a range of 1–31 visits per patient. Most patients were receiving multiple medications and presented with several complaints. The complexity of their illness and frequent requirements for intravenous fluids, antibiotics, electrolytes, and blood products resulted in a prolonged length of stay compared to other EDs. The high level of acuity is reflected in the 10.9 % mortality rate associated with admission of these patients [4]. The mortality rate is higher for patients with hematologic tumors (13.6 %) than for patients with solid tumors (9.8 %).

Patients are presented to the oncologic ED with a multitude of different complaints. At MD Anderson, the most common chief complaint is fever, present in 23 % of patients. This is closely followed by abdominal pain, generalized pain, shortness of breath, nausea and vomiting, weakness and fatigue, back pain, chest pain, bleeding, cough, and diarrhea.

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## Memorial Sloan Kettering Cancer Center

Memorial Sloan Kettering has an Urgent Care Center (UCC), dedicated solely to the care of oncology patients. The number of patient encounters per year in the UCC has steadily increased from 14,800 in 2000 to 21,800 in 2013. Although the UCC receives Memorial patients who arrive from the community via ambulance, general 911 calls from the community are not brought to Memorial. The physical size of the unit has grown over time. Originally an eight-bed unit with and adjunct clinic space, the UCC now consists of 19 telemetry beds and 4 transfusion chairs. Turnover of these beds occurs more than four times per day.

The driving forces behind this growth are an increase in the number of patients receiving treatment at Memorial

Sloan Kettering and the continued transition of oncologic care away from the inpatient setting. As cancer treatment paradigms change, the UCC is key to the institution's ability to provide acute evaluation and management to an increasingly large and complicated outpatient population. The recent addition of a freestanding same-day surgical center and the continued expansion of the outpatient bone marrow transplantation program are examples of the trend toward outpatient treatment of cancer patients.

The clinical staff consists of 13 full-time board-certified internal medicine physicians, some of whom have completed subspecialty training in palliative care, anesthesia/critical care, and infectious disease. UCC physicians are considered academic faculty who are responsible for teaching medical students and residents from Weill Cornell Medical College as well as participating in clinical research.

Patients treated in the UCC reflect the spectrum of disease seen at Memorial. Most patients have solid tumors (72 %) and are evaluated for acute complications of their disease and treatment. The most common chief complaints include dyspnea (17 %), fever (14 %), pain (11 %), nausea (10 %), and fluid/electrolyte disturbances (9 %). The average length of stay in the UCC is 4 h, and slightly more than half of the patients seen in the UCC will require admission to the hospital. Occasionally, patients with advanced disease who have been treated at other institutions or individuals with a suspected but unconfirmed cancer diagnosis seek to transfer their care by visiting the UCC. Emergent problems are acutely managed; however, referral for expedited outpatient evaluation is the preferred pathway, as the UCC is not intended to be the first point of contact for a new patient.

The UCC has attempted to integrate successful models of care from emergency medicine as volume and throughput have increased. A modified Emergency Severity Index tool is used for triage. Patients are assigned a score of 1–5 based on the need for a lifesaving intervention, the presence of a high-risk situation, the number of resources a patient will require, and predefined vital signs. Specific triaging emphases that reflect the unit's focus on oncology include with the rapid identification any of the following conditions: recent bone marrow transplantation, febrile neutropenia, and potential spinal cord compression. During peak hours, a UCC physician assists the triage nurse, a model that has been associated with faster throughput and improved patient outcomes in non-cancer EDs [6].

As many patients are referred internally by treating oncologists and surgeons, an electronic "UCC Notification Order" allows these individuals to communicate the most likely diagnosis, the need for admission, and which tests and consultants will expedite care.

Oncology patients have an inherent risk for developing sepsis. An institutionally derived algorithm is used to screen all

electronically documented vital signs for sepsis. When potentially significant abnormalities are identified, an alert is triggered, prompting a clinician to assess the patient for the possibility of sepsis. This process is time sensitive and requires the clinician to either document a reason for exclusion (dehydration, arrhythmia, end-of-life/palliative care, etc.) or acknowledge the alert and initiate the sepsis management protocol within 30 min.

Patients who arrive critically ill and in need of an immediate intervention such as endotracheal intubation, cardiopulmonary resuscitation, or initiation of vasopressor support are frequent challenges in cancer EDs. At Memorial Sloan Kettering, the primary oncologist has often already established and documented the goals of care in the electronic medical record. If the patient has previously consented to a DNR order, this information is displayed in the header at the top of the screen, next to the patient's name and medical record number. This order must be confirmed and renewed with each hospitalization, as per New York State law. For critically ill patients without previously established advanced directives, the UCC clinician will rapidly determine the goals of care with the patient, healthcare proxy, and primary physician at MSK. For individuals who decline life-sustaining interventions, the UCC clinician will enter a DNR order and initiate palliative care. Pre-existing order sets for narcotic analgesia and a palliative care consultant facilitate care. A medical ethics consultation service is available 24 h a day for encounters in which the goals of care are difficult to establish.

A Fast-Track Pathway is used for patients with a low Emergency Severity Index (ESI) score. One of the most common diagnoses in this group is a new, suspected, or incidentally identified thromboembolic disease. If anticoagulation is indicated, the patient is often discharged on rivaroxaban with close follow-up in the Anticoagulation Management Clinic.

In July 2013, the UCC opened an observation unit, intended for patients who were unsuitable for discharge but had an expected duration of care lasting less than 24 h. Although the observation unit is physically located in the hospital, this nine-bed unit is considered an outpatient service and is staffed by UCC physicians and mid-level providers. During the first 6 months of the program, roughly 10 % of UCC visits ( $n=1013$ ) resulted in patient placement in the observation unit. The proportion of admissions to the hospital from the UCC with a length of stay less than 24 h dropped significantly after observation unit implementation (2.4–1.1 %). The most common reasons for observation unit placement are fluid and electrolyte disorders (14 %), pain control (14 %), dyspnea (13 %), and fever (9 %). Interventions for patients in the observation unit include placement or revision of drainage catheters (pleural, biliary, genitourinary tract, abscess); endoscopy and transfusion in patients with hemodynamically stable gastrointestinal bleeding; correction of uncomplicated electrolyte derangements; administration of intravenous (IV), antiemetics, IV

antibiotics (for treatment of cellulitis, pneumonia, and uncomplicated febrile neutropenia), or IV analgesia; and the management of severe constipation. Approximately one third of patients placed in the observation unit require admission to the hospital for ongoing care. Extending the observation period to 48 h may decrease this number.

Approximately 15 patients a week are seen in the UCC for elective palliative paracentesis, which is performed by the UCC clinical staff. Drainage of symptomatic pleural effusions is performed in the observation unit by pulmonary medicine. Patients with low-risk febrile neutropenia are either discharged or placed in the observation unit for 24 h.

When possible, management decisions are made with input from a patient's primary oncologist or surgeon, who is notified automatically by e-mail during check-in and discharge. While these individuals may be off-site, they are able to review all relevant clinical data, including lab findings, chart notes, and radiology and telemetry results. An electronic status board, visible on all computer terminals within the institution and on overhead monitors in the UCC, facilitates a quick grasp of key metrics related to an individual patient and overall throughput at any given time. This tool facilitates communication about arrival and waiting times, who are treating or covering UCC staff, pending diagnostic tests and consultants, disposition (admitted/discharged/observed), and bed status.

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## Asan Medical Center

The Asan Medical Center in Seoul, Korea, opened a Cancer ED in 2010. Asan is a 2700-bed tertiary medical center and the largest hospital in South Korea. The number of ED visits per year is over 100,000, and approximately 10 % of cancer patients in Korea receive their care there. Hospital beds for cancer patients are almost always full. The ratio of solid-tumor patients to hematologic-tumor patients treated at Asan is over 2 to 1. The most commonly treated malignancy is gastric carcinoma. Stem cell transplantation is also provided at Asan.

Asan's Cancer ED is located on a different floor from the primary ED. The Cancer ED consists of 30 beds and serves approximately 30 patients per day. Care is provided to patients on stretchers in an open-ward format. Private rooms are provided for patients who require isolation for airborne infections in the ED intensive care unit, known as the acute care unit. Length of stay in both EDs is limited to 72 h. Cancer patients who are being managed by the Asan Medical Center Oncology/Hematology departments are triaged to the Cancer ED from the main triage intake area. If the Cancer ED is full, the patients are treated in the main ED. Patients who are not currently being treated at Asan for their oncology problems are not admitted to the Cancer ED; they are cared for in the main ED. Patients who are critically ill, presenting for shock

or requiring cardiopulmonary resuscitation or immediate airway placement, are managed in the main ED.

The unit is staffed with an emergency physician assisted by alternating emergency medicine and internal medicine residents. The residents spend a 2-month rotation working in the Cancer ED. The unit is also staffed with two nurse practitioners and four registered nurses during the day and one nurse practitioner and four registered nurses in the evening. Nighttime staffing consists of four registered nurses. The nurses staffing the Cancer ED unit are dedicated to the Cancer ED and do not staff the main ED at other times. Oncology and hematology staff members round on their patients in the ED daily and assist in the decision making and management of these patients as needed. Upon a patient's arrival to the Cancer ED, oncology fellows are notified immediately via a text message through their cellular phones and evaluate the patients once the initial workup and treatments have been completed by the emergency physicians. Simple procedures such as thoracentesis and paracentesis are performed by physicians and mid-level providers. More complicated procedures are usually performed by interventional radiologists. Cellular phones, rather than pagers, are used to communicate between physicians free of charge inside the hospital facility; this is called a "Free Zone" and is sponsored by one of the communication companies in Korea.

The Cancer ED is divided into four zones and a fast track. Patients who present with unstable vital signs or other acute symptoms that are deemed "high risk" are assigned to the fast track and receive close monitoring and expedited evaluation and treatment.

In the first year, 5502 patients were treated in the Cancer ED. The length of stay was approximately 34 h. By opening the Cancer ED, Asan Medical Center reduced its admission rate of oncology patients from 85 to 42 %.

The predominant services provided in the Cancer ED are administration of antibiotics (28.9 %) and pain control (22.9 %) with opioids. Drainage procedures, including percutaneous drainage of effusions, stent insertion for obstructed bowel, drainage of biliary or urinary tract obstructions, repositioning of previously existing catheters, and other procedures, constitute 17.5 % of services provided. Supportive care with nutrition, parenteral hydration (10.7 %), colony-stimulating factor administration for neutropenia (8.3 %), whole-brain radiation or gamma-knife radiosurgery, and palliative radiation for metastatic bone pain or spinal cord compression (6.4 %) were also common treatments. Anticoagulation for newly diagnosed venous thromboembolism and vascular interventions, including occasional placement of inferior vena cava filters or superior vena cava stents, are important treatments done in the Cancer ED. Patients who present with pulmonary emboli begin anticoagulation therapy in the Cancer ED. The most commonly used drugs are dalteparin and rivaroxaban,

and the therapeutic decision is made by the oncologists involved in the patients' care. Additionally, 7.8 % of patients received transfusion of blood products.

The hospital does not have specialists in palliative or supportive care and hospice care is not provided in the Asan hospital. When physicians decide that hospice care would be the best choice for the patient, "hospice coordinators" are notified to explain hospice and arrange care at a hospice center near the patients' home.

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### **The Clatterbridge Cancer Centre and Merseyside and Cheshire Cancer Network**

The Clatterbridge Cancer Centre (CCC) and Merseyside and Cheshire Cancer Network (MCCN) in England are parts of the British National Health Service. Their dilemma was how to provide emergency care to oncology patients in a system in which much cancer treatment is provided in outpatient environments that are divergent in location and do not have closely associated EDs. This had resulted in oncology patients with acute care needs being seen in EDs that were not closely affiliated with the oncology practices. Common problems were patients being treated by physicians who did not have adequate knowledge about their needs and a lack of communication back to the oncologist regarding the resultant ED visit or hospitalization. The 2008 National Confidential Enquiry into Patient Outcomes and Death highlighted an urgent need to improve the quality, safety, and efficiency of care for cancer patients following emergency presentation to acute general hospitals. In response to this dilemma, CCC and MCCN set up an Acute Oncology Service (AOS) in 2010. This network-wide service was commissioned and implemented on the basis of recommendations from the National Chemotherapy Advisory Group [7].

Through a continuous program of raising awareness regarding both the role of the AOS and the necessity of early patient referral to acute oncology teams, the acute oncology teams have been able to establish an AOS across all acute trusts in their cancer network. The network-wide AOS has improved communication across clinical teams, enabled rapid review of patients by oncology staff, reduced hospital stays, increased understanding of oncologic emergencies and their treatment, and enhanced pathways for rapid diagnosis and appropriate referrals for patients presenting with malignancy of undefined origin (MUO) or cancer of unknown primary (CUP). These achievements have been made by developing a network protocol book for managing common oncologic emergencies, such as febrile neutropenia and malignant spinal cord compression; by introducing local pathways for managing MUO and CUP; and by collaborating with palliative care teams.

MCCN provides cancer services for a population of 2.3 million people in North West England and the Isle of Man and incorporates seven acute hospital trusts. (National Health Service trusts are essentially public sector corporations serving a geographical area or specialized function.) CCC provides tertiary inpatient chemotherapy, radiotherapy, and day-case chemotherapy services and is a stand-alone trust with no acute on-site services. In this trust, over 70 % of systemic cancer treatments are delivered in local hospitals, which are supported by nine satellite chemotherapy clinics and one satellite radiotherapy unit. Chemotherapy services are nurse led, and consultant oncologists may not be on site. Owing to the geography of the region covered by the CCC, cancer patients who require acute medical care present to local hospitals. Before the establishment of an AOS, these patients did not routinely receive specialist oncology review, although 24-h telephone advice was made available by CCC for patients and healthcare professionals alike.

The aim of the AOS is to improve the quality of care for cancer patients following emergency presentation to acute general hospitals because of cancer or treatment-related complications. Reports indicating the need for improved care of cancer patients presenting acutely to hospital show that these patients account for 5 % of all acute hospital admissions, costing the National Health Service approximately £1 billion per year. There is a national increase in the use of systemic cancer treatments and a rapid expansion in the availability of novel agents (including oral drugs). In addition, more treatments are being delivered locally rather than in tertiary cancer centers. These changes all contribute to the increase in patients presenting to local hospitals and being managed by non-cancer specialists [7].

The team model consists of two or three consultant oncologists (one being the lead acute oncology [AO] consultant for the trust), at least one full-time cancer nurse specialist, and secretarial support. The team provides a 5-day service, including one consultant providing 4 h of direct clinical care per day (Monday to Friday) and cancer nurse specialist support for 5 full days. The patients remain under the care of the admitting consultant within the local trust, with the AO providing an advisory service. Each AOS oncologist also provides one or more site-specialized services at the trust where they provide AO support. The annual work plan for each AO team is supported by a local steering committee that includes the lead AO consultant, the local lead cancer clinician, an oncology nurse, a hematology consultant, an emergency medicine consultant, an acute medicine consultant, a palliative care consultant, a rehabilitation lead for malignant spinal cord compression, and a radiologist.

The AOS developed protocols for the management of oncology emergencies presenting to the ED and acute medical units. Individual AO teams provide regular training for the ED and acute medical unit healthcare professionals. In addition,

they train physicians who participate in acute “on-take” and liaise closely with the patient’s primary oncologist.

Since 2010, the MCCN AOS has seen over 10,000 patients, providing high-quality specialist care and leading to a reduced length of hospital stay of over 3 days. Patients are admitted mostly through the ED, with some also being admitted to the acute medical unit following assessment by their general practitioner either at home or in the practitioner’s office. Following presentation to the ED, patients, in line with government targets, have to be seen within 4 h, after which they are either discharged home or (more likely) admitted. The AO team is alerted to all oncology patients and will either see the patient in the ED or more usually on the ward. Of oncology patients presenting for emergency admission, an average of 19 % have newly diagnosed cancer, the most common being lung, gastrointestinal, and MUO/CUP cancers. Thirty-three percent have complications of cancer treatment, the most common being neutropenic sepsis and treatment-induced diarrhea, and 48 % are complications of cancer itself, such as malignant spinal cord compression, superior vena cava obstruction, or disease progression. Most patients are discharged home from the hospital, but on average 10–12 % of patients die during their hospital stay. Of these, over half are patients who are admitted with complications of the cancer itself and are near the end of life. Patients presenting with complications of treatment usually have the shortest hospital stay (approximately 6 days), and lowest risk of inpatient death (6.5 %), whereas patients presenting with complications pertaining to end of life, including those presenting with a new cancer in the advanced stage, have the longest average hospital stay of 10–15 days. Such patients are identified early, and the AO teams work closely with palliative care medicine, discharge planning teams, and local hospice to facilitate symptom control and discharge to the patient’s preferred place of care for the terminal phase of their cancer.

The response from patients and their caregivers to this new model has been overwhelmingly positive. Oncology patients can feel vulnerable when being admitted to a non-cancer hospital and worry that the healthcare professionals they see will not understand about their cancer or its treatment. They found that being seen daily by a specialist oncology nurse or doctor, who will advise on the best management and who will also liaise with the patient’s primary, tumor specific, oncologist ensuring, for example, that appointments for clinics or cancer treatments are rescheduled or appropriate changes to chemotherapy dosing and scheduling are made if indicated, gives enormous psychological support and feelings of safety to the patient and their caregivers.

The CCC-MCCN AO model provides high-quality specialist care to acutely unwell cancer patients and is a service that has been achieved by positive engagement with each

host trust. AO is now part of the National Peer Review Programme, and any British hospital with an accident and emergency department should have an AOS in situ [8].

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### **The Ohio State University Comprehensive Cancer Center: Arthur G. James Cancer Hospital and Richard J. Solove Research Institute**

Several institutions have approached MD Anderson seeking expertise for the design of new emergency services for cancer patients. The Ohio State University Wexner Medical Center is currently in the process of developing a specialized ED to care for its cancer patients, with plans to open in April 2015. The ED currently cares for all cancer patients that arrive seeking emergency care: approximately 70,000 patients per year. They currently evaluate approximately 30 oncology and hematology patients per day. All patients who have active cancer and a potential cancer-related problem will be triaged to the ED at The James, which is integrated within the main ED.

One of the challenges has been to develop triage criteria to perform this function effectively and to maintain equity among all patient types. The plan is to dedicate an area with 15 treatment spaces within the ED that would be allocated to the care of cancer patients. Ten of the rooms are private, four have private bathrooms, and two have negative airflow. The other five spaces are treatment bays with lounge chairs for infusions. On days with a larger number of oncology and hematology patient visits than the 15-bed space can accommodate, additional patients will be evaluated in the main ED. Similarly, when there are fewer James ED patients, non-cancer patients will be evaluated as needed in the James ED. This will ensure equal access to emergency care for all patients, regardless of disease state.

Nurse practitioners who have cross-trained in the ED and the cancer center will staff the cancer ED, along with emergency medicine faculty members who have expressed an interest in cancer care and have a strong background or additional training in internal medicine. During high-volume periods of the day, a dedicated team will care for these patients. During off hours, other faculty members and residents will cross-cover the James ED treatment spaces. The ED group also anticipates that at least two emergency physicians who have completed a palliative care fellowship will lend specialized expertise to the operations of the James ED.

One area already addressed is the difficult issue of the patient with neutropenic fever, a patient type that is often difficult, but critical, to recognize. Many of these patients may appear well and traditionally have had to wait with other patients for further evaluation, even though a prolonged time

to antibiotics can result in deterioration and development of sepsis. To improve the management of these patients, The James has added the criterion that any patient with a fever who has received chemotherapy or radiation in the prior 2 weeks will be evaluated under the ED Sepsis Alert process. This process brings together a multidisciplinary team to expedite initiation of IV antibiotics and diagnostic workup for this high-risk population of patients.

Other clinical scenarios The James anticipates is the use of the chair unit to address the time-consuming infusion of electrolytes and blood products. They are developing an expedited admission pathway for patients who have been identified by their oncologist or hematologist as in need of admission. Additionally, a new inpatient service that will handle care for patients without a definite cancer diagnosis but identified as being at high risk for malignancy (i.e., new, large lung mass) has been created to facilitate the care of patients with a presumed diagnosis of cancer who may be attracted to the cancer ED. Patients who are not already receiving their cancer care at The James will be able to be seen in the James ED to facilitate transition of their care to the cancer center.

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### **Considerations for the Cancer ED**

Increasing specialization has resulted in a fragmentation of medical care and cancer care is no exception. Many oncology patients are treated by several physicians who are all specialists in cancer therapy. One patient may have one or more surgeons, a medical oncologist, a radiation therapist, a palliative care physician, and other specialists, such as cardiologists, and pulmonologists involved in their care. Patients are often confused as to which doctor is “in charge” and whom to ask which question. The role of the emergency physician in a comprehensive cancer center has some similarities to that of a primary care physician. The ED physician often explains the roles of the different providers and facilitates communication between the various specialties involved in the patients’ care. Another important role is that of a safety net, by providing care to the patients when they cannot wait for an office visit or when the office visit results in the discovery of a problem that is beyond the scope of the oncologist or specialist. In these roles the emergency department supports both oncologists and patients. Physicians specializing in oncologic emergencies use unique skills and knowledge of potentially dangerous complications of different treatment modalities and the best supportive therapies as well as understanding of the disease process of multiple different malignancies and their associated emergencies. Also valuable are expertise in pain management, procedures commonly needed in cancer patients, and skillful management of palliative and end-of-life care.



This skill set, which currently, can only be obtained through experience, helps doctors who specialize in the acute care of cancer patients make decisions regarding the aggressive or supportive nature of the care provided in the cancer ED.

Several themes are prevalent in the acute care of cancer patients. One of the concerns expressed by physicians seeking to provide acute care to oncology patients is access to the complete medical record and the expertise of the oncologist. The ED physicians must have a significant understanding of the treatment paths and modalities of the patients they are seeing. In order to make appropriate decisions, communication must be available with the oncologist and other supportive services. With more knowledge and experience, the emergency physician can be more effective in support of the patients and the oncologists and be more confident in their independent decision making. A method of documentation and a process of communication that make the primary oncologist aware of all visits to the ED are optimal. At MD Anderson, an online medical record documents the visit and outcome, and is accompanied by an e-mail notifying the oncologist of the emergency visit, closing the communication loop. Sloan Kettering has gone one step further by posting the ED tracking board throughout the institution. The CCC-MCCN network uses an acute oncologist to liaise with the primary oncologist. These institutions have developed treatment algorithms that further guide and support the care of cancer patients in the ED. Examples of these algorithms are treatment of chemotherapy-induced nausea and vomiting, malignant spinal cord compression, and neutropenic fever. The ED can play an important role in developing and supporting these algorithms.

Another common concern is that caring for this group of patients is very labor intensive. These patients are often very ill; many of them are not independently ambulatory. Most of the patients are on multiple medications and have numerous comorbidities and several complaints. Due to the complexity of their illness, their stay in the ED is longer than that of other populations. Many of the patients require electrolytes or blood replacement as an incidental finding or the reason for the visit. These processes add to the time in the ED and the nursing workload. The ubiquitous admission rate of over 50 % and the high mortality rate of patients admitted through the ED are further testimony to the high acuity level of the patients.

An ED that treats only cancer patients does not have to devise a triage method to identify the cancer patients from the non-cancer patients, and recognition of neutropenic fever, sepsis, and infection with underlying immunocompromised is routine. Other problems, such as managing intractable pain and mixing and adjusting large doses of opiates, are a frequent occurrence. However, these are issues that EDs—who want to support a large cancer population

but cannot be dedicated solely to that population—contend with. A frequent issue more unique to a cancer ED is the arrival of patients with a recent diagnosis of suspected or confirmed malignancy. One of the challenges of working in a cancer ED is handling a group of patients with varying degrees of illness, varying knowledge about their condition, and different stages of diagnosis who have recently received difficult news and are emotionally charged. At MD Anderson, several methods are used to defuse the situation and get patients the help they need as best as possible. Patients with a recent diagnosis who do not need admission for a medical emergency are given the name of a self-referral line and contact information for a patient advocate whose job is to aid new patients who have come to the emergency center seeking help. The advocate assists the patients with referral to the appropriate cancer specialist and will provide guidance on funding sources if necessary. MD Anderson also has a “suspicion of cancer” clinic that evaluates new patients and expedites their referral to the appropriate oncology specialist by establishing the diagnosis and/or initiating staging tests. This clinic works closely with the emergency center and is notified via an e-mail that includes doctors, schedulers, and financial specialists while the patient is in the emergency center. In all of the functioning cancer EDs interviewed, avoiding having the cancer ED serve as the intake portal for the cancer institute has been a common theme. Another frequent challenge is patients with late-stage cancer with no prior relationship to the parent institution. Many of these patients have received treatment at other centers and when told that no further treatment options exist, go to the cancer ED hoping for a salvation therapy. These patients are often too sick to be discharged, and without the evaluation of an oncologist in the emergency center will ultimately be admitted to the hospital for an expert opinion and transition to supportive care or hospice. A consulting service that is available to see such patients in the ED would make this process more satisfactory.

Therapeutic procedures frequently utilized in cancer patients necessitate the development of certain services. Oncology patients have a frequent need for invasive procedures such as thoracentesis, paracentesis, stenting, and percutaneous drainage. Some of these procedures can be done by emergency department physicians, but they are time-consuming and difficult to perform in a busy ED. MD Anderson has developed a team of mid-level providers that provide paracentesis, thoracentesis, lumbar puncture, and central-line insertion and port removal throughout the institution during extended hours. At Asan, one of the most common procedures is placement of biliary drains, and the center has developed a pathway for expedited treatment of these patients in partnership with their interventional radiology service.

Another common diagnosis is the incidental finding of pulmonary embolus on CT scans. Many of these patients are handled in the emergency center at Memorial Sloan Kettering, MD Anderson, and Asan Medical Center. These patients are routinely treated as outpatients at all three institutions. At Memorial Sloan Kettering, these patients are seen on a fast track and treated with oral Factor Xa inhibitors if possible. At MD Anderson, low-molecular-weight heparin is the default treatment, and at Asan, a combination of drugs is used depending upon individual physician preference. Both Memorial Sloan Kettering and MD Anderson have anticoagulation clinics for the follow-up of these patients, and pathways have been devised for determining insurance coverage, follow-up visits, and education of the family and patient.

The optimal medical management of many cancer-related emergencies is an excellent area for further research. Many practice patterns are based on expert opinion or prior experience rather than clinical trials. Formal training for treatment of oncologic emergencies is not available and currently must be learned through work experience. Examples of frequently treated problems that could be better supported by research are treatment of hyponatremia and hypercalcemia of malignancy, rescue treatment of chemotherapy- or radiation-induced nausea and vomiting, chemotherapy- or radiation-induced diarrhea and mucositis, chemotherapy-induced peripheral neuropathic pain, pain related to colony-stimulating growth factors, dosage of steroids and radiation in malignant spinal cord compression, and acute management of narcotic-induced constipation. Other important areas include treatment of therapy-associated skin rashes and management of medical problems with unique complications, such as venous thromboembolism and acute coronary syndrome in thrombocytopenic patients and anticoagulation of patients who have metastatic disease to the brain.

In summary, the care model used for patients with oncologic emergencies must be tailored to the local medical and oncology environment; therefore, it naturally follows that different medical systems have developed different processes to care for these patients. A constant among the models discussed here is the underlying goal of care being provided to these patients by clinicians who are knowledgeable about their needs and have integrated communication with the primary oncologists. Acute care of the oncology patient is gaining recognition as an important area that could be improved upon with increased training, research, and emphasis on integration into the oncology system.

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