

Leveraging Technology to Reduce Hospital and Emergency Room Admissions and Identify Patient Comorbidities



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Years before value-based care agreements and alternative payment methodologies became a reality, community oncology practices had a major blind spot when it came to hospital and emergency department (ED) admissions.¹ As practices joined the Centers for Medicare & Medicaid’s Center for Medicare and Medicaid Innovation Oncology Care Model (OCM) pilot, the need for these data became glaringly apparent. Community oncology practices that participate in the OCM are responsible for all Medicare Part A and B costs and most of Medicare Part D costs for patients attributed to the OCM program—regardless of the cause or connection to their cancer diagnosis.² OCM reconciliation data, along with other commercial payer value-based care data, quickly uncovered the disparate gap with hospital- and ED-related costs attributed to patients with cancer (Table 1, page 62).³ These OCM reconciliation data also showed very high costs associated with comorbidities, specifically when patients with comorbidities presented to the hospital or ED.

Tennessee Oncology’s Medical Home Pilot

Tennessee Oncology is a physician-owned community oncology practice based in Nashville, Tenn., with more than 30 locations across middle and east Tennessee and northern Georgia. The practice has just under 100 physicians and more than 60 advanced practice providers. Most providers represent medical oncology, with others representing gynecologic oncology, radiation oncology, palliative care, psychology, and genetic counseling.

Though drug costs are an increasingly important topic as it pertains to value-based care, this article will focus on our approach to reduce hospital-related and comorbidity costs.⁵

In 2015 Tennessee Oncology understood that alternative payment methodologies were on the horizon and launched a medical home pilot. The primary focuses of our medical home pilot were clinical pathways, palliative care, telephone triage, and care coordination. Because the medical home was a new program, Tennessee Oncology created many new processes and procedures, addressed several new staffing needs, and introduced new technologies. This new technology allowed for ongoing data collection, which accelerated quality improvement efforts and led to improvement in key performance indicators, primarily related to telephone triage (Figure 1, page 63).⁴ It was, however, difficult to show a return on investment for technology costs and human resource expenses.

Table 1. Medicare Expenditures per Beneficiary per Month by Type of Service (Risk-Adjusted Four-Quarter Average for April 2019 to March 2020, Excluding Medicare Part B and Part D Drug Costs)

Cost Category	Cost per Patient (\$)	Percentage of Costs
Inpatient admissions to short-term acute care hospitals and critical access hospitals, all causes	866.00	13.2
Excluding admissions for chemotherapy, bone marrow transplant, and cancer surgery	753.00	11.5
Unplanned readmissions within 30 days of discharge	206.00	3.1
Resulting from ED visit and/or observation stay	555.00	8.4
Resulting from ED visit only	451.00	6.9
Resulting from observation stay only	19.00	0.3
Resulting from ED visit that led to an observation stay	85.00	1.3
Resulting from neither ED visit nor observation stay	316.00	4.8
Observation stays not leading to admissions	28.00	0.4
Resulting from ED visit	16.00	0.2
Not resulting from ED visit	12.00	0.2
ED visits not leading to admission or observation stay	25.00	0.4
Radiation oncology in all ambulatory settings	181.00	2.8
Physician services, excluding (1) lab/testing/imaging, (2) radiation oncology, and (3) Part B drugs	589.00	9.0
Oncology providers	86.00	1.3
Other providers	503.00	7.6
Ancillary services in all ambulatory setting	400.00	6.1
Laboratory and testing: Total	179.00	2.7
Laboratory and testing: Advanced	144.00	2.2
Laboratory and testing: Other	36.00	0.5
Imaging: Total	221.00	3.4
Imaging: Advanced	108.00	1.6
Imaging: Other	113.00	1.7
Other outpatient facility services	259.00	3.9
Home healthcare	91.00	1.4
Skilled nursing facility	91.00	1.4
Long-term care hospital	5.00	0.1
Inpatient rehabilitation facility	53.00	0.8
Hospice: All	76.00	1.2
Hospice: Facility only	11.00	0.2
Hospice: At home only	60.00	0.9
Hospice: In both settings	5.00	0.1
Durable medical equipment, excluding Part B drugs	33.00	0.5
Total expenditures (cost per patient)	6,576.00	
Hospital related expenditures	3,332.00	50.7

ED = emergency department. *Source:* OCM Practice Feedback Report for the period Jan. 1-Mar. 31, 2020. Data exclusive to Tennessee Oncology and provided by the Centers for Medicare & Medicaid's Center for Medicare and Medicaid Innovation. Prepared by RTI International, 3040 Cornwallis Road, Research Triangle Park, NC 27709; Actuarial Research Corporation (ARC), 6928 Little River Turnpike, Annandale, VA 22003; and Telligon, 1776 West Lakes Parkway, West Des Moines, IA 50266; September 2020.

Tennessee Oncology's OCM Participation

Launched in June 2016, the OCM offered the opportunity to expand our medical home program to meet OCM requirements and to obtain payer-level data that might answer many of our questions on our return on investment and operational success. Tennessee Oncology applied for and was accepted as an original OCM pilot participant. As an OCM participant, Tennessee Oncology receives monthly care management payments that allow us to expand our care coordination and palliative care teams to serve our large Medicare patient population, which is approximately 35 percent of our total patient-payer mix.

In 2021 Tennessee Oncology opted-in for two-sided risk in the OCM pilot. This additional risk requires that we sharpen our focus on resource management and further cost reductions. Though Tennessee Oncology has been successful overall in our value-based care contracts, including overall cost savings in all payment periods for the OCM pilot thus far, the data, unfortunately, are received six months to one year after the payment period. This delay in data delivery makes it difficult to use these data for real-time operational changes. However, we are using these data to identify opportunities for long-term improvement and operational movement. Using data analytics, we realized that we had three major gaps from a patient-cost perspective as it relates to value-based care:

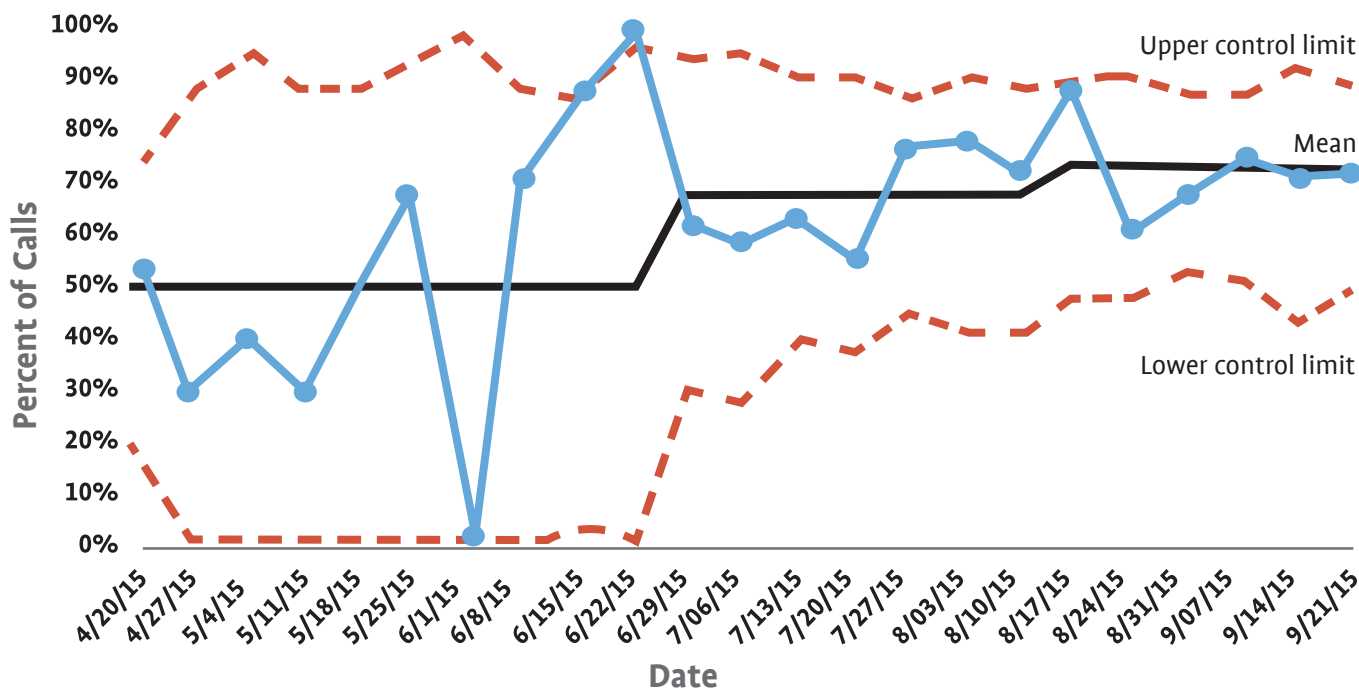
- Drug costs
- Hospital-related costs
- Costs associated with patients with comorbidities.

Though drug costs are an increasingly important topic as it pertains to value-based care, this article will focus on our approach to reduce hospital-related and comorbidity costs.⁵

Hospital and Emergency Room Utilization

It is well documented, even beyond our OCM experience, that patients with cancer generally have some type of hospital-related costs during their disease treatment.⁶ Outside of drug costs, ED and hospital visits are the most expensive contributors to a patient with cancer's cost of care. Though it has always been our goal at Tennessee Oncology to minimize unnecessary hospitalizations, we were not well resourced to make that a primary focus prior to our medical home, because the bulk of our resources were focused on day-to-day clinic operations. Participation in value-based care programs magnified the need to be able to track or be notified when one of our patients presented to the ED or hospital.⁶ Often, many of the reasons why patients go to the ED are non-emergent issues that can generally be resolved in an outpatient setting like our clinics or infusion suites.

Figure 1. Symptom Management Calls Receiving Clinical Intervention Within Two Hours (April-September 2015)



Source: Data exclusive to Tennessee Oncology; Data provided by Tennessee Oncology and published in *J Oncol Pract*.⁷

Additional costs associated with untimely or unneeded ED visits or hospital admission(s) are the workup elements. Tennessee Oncology's physicians and advanced practice providers are trained and guided to do the most thorough workup recommended by accredited entities, such as the National Comprehensive Cancer Network guidelines or evidence-based pathways applications. These workups almost always include extensive labs and imaging. ED physicians or internists have little to no visibility into the patient's medical history outside of the hospital. Recent workups not performed in the hospital are generally not available to the hospital providers. As standard practice, ED physicians follow their workup procedures, which often lead to unnecessary or repeated labs or scans that often had been recently completed elsewhere.

Tennessee Oncology formed a Care Transformation Team with the focus of addressing admissions in real time, as well as follow-up care for discharges.

An additional gap surrounded discharge from the ED or hospital. Almost across the board, there is no process for a hospital to notify our practice when our patients are being discharged from the hospital or ED.

As we faced these challenges and worked toward keeping patients out of the ED and hospital, we quickly realized that there were no viable or feasible avenues that gave us a real-time alert when patients presented to the ED or hospital or even any acceptable reflective information of why patients presented to the ED or hospital. Around this time, we entered into a value-based contract with a single payer in which the payer provided us daily with a hospital file; however, the information was 48 to 72 hours old. Though this was the best window into ED visits and hospitalizations of any of our patient populations, the delay of two to three days, coupled with the payer representing less than 5 percent of our overall payer mix, was not significant enough for us to gauge our success or needs for our entire patient population.

Reducing ED Visits and Hospital Admissions

Tennessee Oncology implemented many solutions to lower ED and hospital utilization, including:

- 24-hour on-call physicians.
- "Call Us First," a patient education initiative about the importance of reaching out to the clinic before going to the ED or hospital.
- A custom telephone triage system.
- Registered nurse care coordinators to proactively engage high-risk patients.
- An online patient engagement tool, also available as a mobile app, which included a patient portal, the ability to direct

message care providers, and a symptom diary in which the patient could log any issues they were having, which would immediately be transmitted to care coordinators or telephone triage nurses.

Our many attempts over the years to work directly with various hospital systems to obtain real-time notifications of our patients' hospital activity failed due to multiple reasons. However, in 2020, Tennessee Oncology partnered with a third-party vendor to potentially provide these real-time hospital alerts. The state of Tennessee had contracted with this company for a project in which the state needed transparency and real-time data on their state Medicaid patient population. Any participating state-reimbursed hospital was required to comply with this program; this included more than 85 percent of the hospitals in the state, which numbered over 100 hospitals. The vendor was forward-thinking and, when contracting for the Medicaid data feed, it negotiated with hospital systems to get all patient data, presumably with the intent to contract with healthcare organizations, like ours, who would be able to turn these data into actionable analytics for performance and quality improvements. Along with the data purchase came access to the vendor's portal with real-time alerts on any patient activity as it pertains to ED visits or hospital admissions, hospital transfers, or hospital or emergency room discharges.

Understanding the impact of these real-time alerts and data, Tennessee Oncology formed a Care Transformation Team with the focus of addressing admissions in real time, as well as follow-up care for discharges. The practice instituted a pilot project using our current care coordinators who managed our value-based care patient populations. We provided the vendor with our full patients with cancer roster (more than 40,000 patients). For the pilot, we identified a small subset of patients based on our current value-based care contracts (approximately 4,500 patients) and focused on four physicians who were already involved with the Care Transformation Team from a physician-leadership perspective. This pilot served several purposes, of which resource determination, improved processes, and data and analytics were a few of the top priorities. The long-term goal: to expand coverage to include all physicians and all patients.

The pilot was set to begin in the first quarter of 2020; however, COVID-19 delayed our contracting and implementation timelines. The contract was signed in the early part of the second quarter of 2020, and the data feed and portal went live in early July of 2020.

Very specific processes were put in place for the pilot. If one of our identified patients triggers an event (ED or hospital admission or discharge) in the vendor's system, an alert is generated (configurable by us) and emailed to our care coordinators. The responsible care coordinator logs in to the nurse portal to address the alert and identify the patient. During this identification process, the care coordinator identifies and logs:

- The admitting and/or triage diagnosis.
- Whether the diagnosis is related to the patient's cancer.
- The admitting and/or treating provider.

At this point, the care coordinator establishes communication with the ED or hospital. This communication allows the sharing of information to avoid duplication of unnecessary testing and workup, such as scans or labs. The care coordinator provides the ED with the last office note(s), recent lab results, recent scans (if applicable), or any other patient records that would be valuable to the ED provider, with the goal of completing the patient's workup, reducing the overall time needed in the ED, and keeping resource costs to a minimum, while also increasing the patient's satisfaction by expediting their discharge.

Once the patient is identified, contact with the ED/hospital is made, and medical records are shared, the care coordinator then determines, based on the admitting diagnosis, the level of involvement needed by a Tennessee Oncology provider. If the admitting diagnosis is related to the patient's cancer, the care coordinator will reach out to the attending Tennessee Oncology provider via urgent communication channels, as established in our policies, to obtain the Tennessee Oncology provider's input on next steps for the patient's care. The provider may then communicate instructions to the care coordinator to relay to the ED or hospital provider, or the Tennessee Oncology provider may reach out directly to the ED or hospital provider to discuss care options. If the presenting diagnosis is not related to the patient's cancer, the

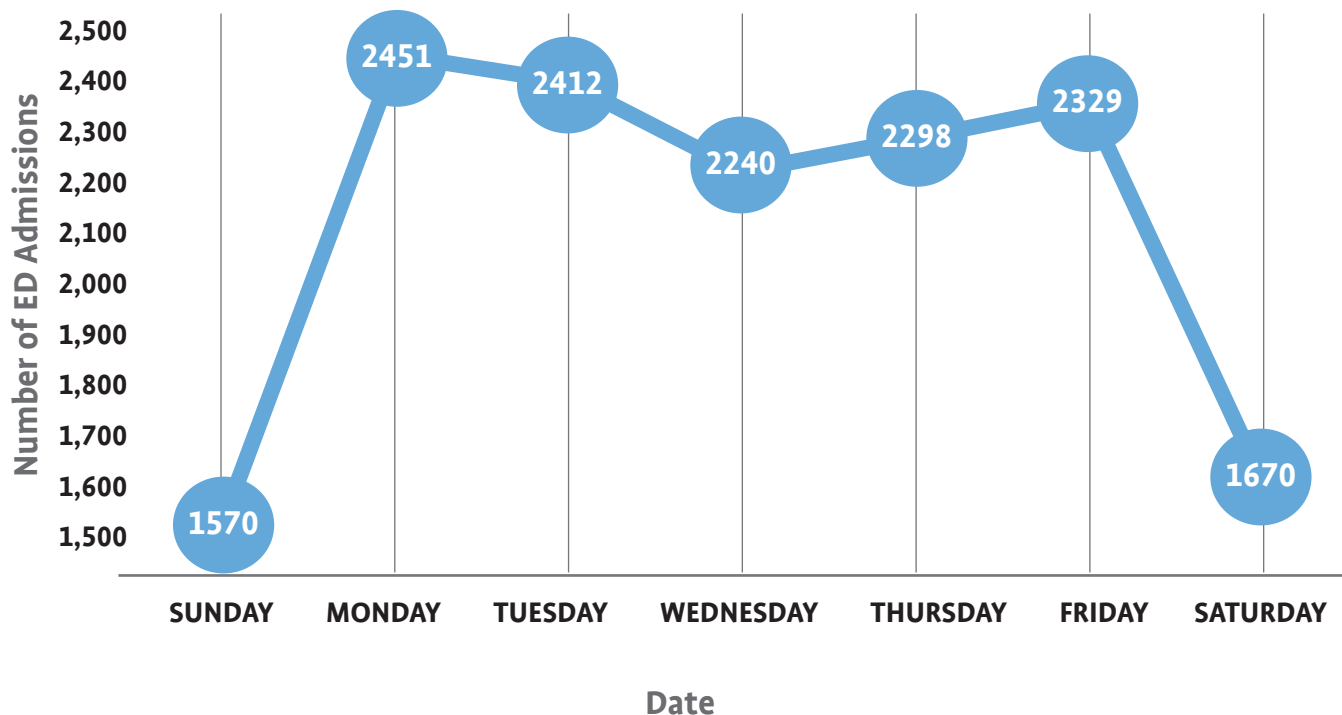
care coordinator notifies the Tennessee Oncology attending provider via non-urgent communication channels to keep the provider informed and improve care coordination.

We quickly identified a gap in this process because patients who go to the ED are often triggered in the alert system without an admitting diagnosis. Because of this gap, the communication step is often moved before the identification step to procure the admitting diagnosis. This involves a manual process where the care coordinator calls the emergency room directly and obtains the admitting diagnosis from ED staff.

A process for hospital discharge was also implemented. Care coordinators receive alerts for ED or hospital discharges. Upon receiving these alerts, a care coordinator reaches out to the patient to arrange follow-up care and support and determine whether an in-clinic or telemedicine appointment is needed within 24 to 48 hours after discharge, with the goal of reducing hospital readmissions.

While this pilot was being implemented, we analyzed the first round of data. These data were provided by the vendor to our data analysts directly via a daily data feed. This feed provided a comprehensive record of patient demographic information, provider information, related Tennessee Oncology provider information, admitting diagnosis, dates and times, and insurance information, among others.

Figure 2. ED Admission Trendline by Day of the Week (July 9-Oct. 25, 2020)



Note: Data exclusive to Tennessee Oncology; data provided by Tennessee Oncology October 2020; not previously published. ED = emergency department.

Analysis of these data showed several conclusive takeaways. First, there is a very distinct pattern associated with hospital and ED admissions (Figure 2, page 65). This pattern shows a prominent peak at the beginning of each work week with a drop-off through the middle of the week and a small peak at the end of the work week, ending with a massive drop on the weekend. This pattern was eye-opening when first discovered. Our assumption had always been that the bulk of our attributed ED and hospital admissions were on the weekends, when the office was closed. This analysis showed the exact opposite. Further analysis was done to show the correlation of the time of admission. Again, this result was the opposite of assumptions. Our assumption was that if admissions were during the work week, then they were happening in the evening and night times, when the clinic was closed. However, the analysis showed the opposite; the admissions were happening mostly between 8:00 am and 4:00 pm, when the clinics were open (Figure 3, below).

Additional analysis is ongoing to compare the incidence of triage calls to the incidence of patient admissions to see whether patients are calling our offices first or are going to the ED or hospital without calling.

Though we are still in the early phases of determining the best process and analyzing the data, we are hopeful to see in our next round of OCM reporting, as well as in our other value-based care key performance indicators, that we are making an impact on reducing hospital and ED utilization and thus reducing the overall healthcare costs of our patients. Additionally, as satisfaction

survey data are available, we are confident that patient satisfaction scores will increase as ED and hospital utilization decrease.

Improving Comorbidity Management

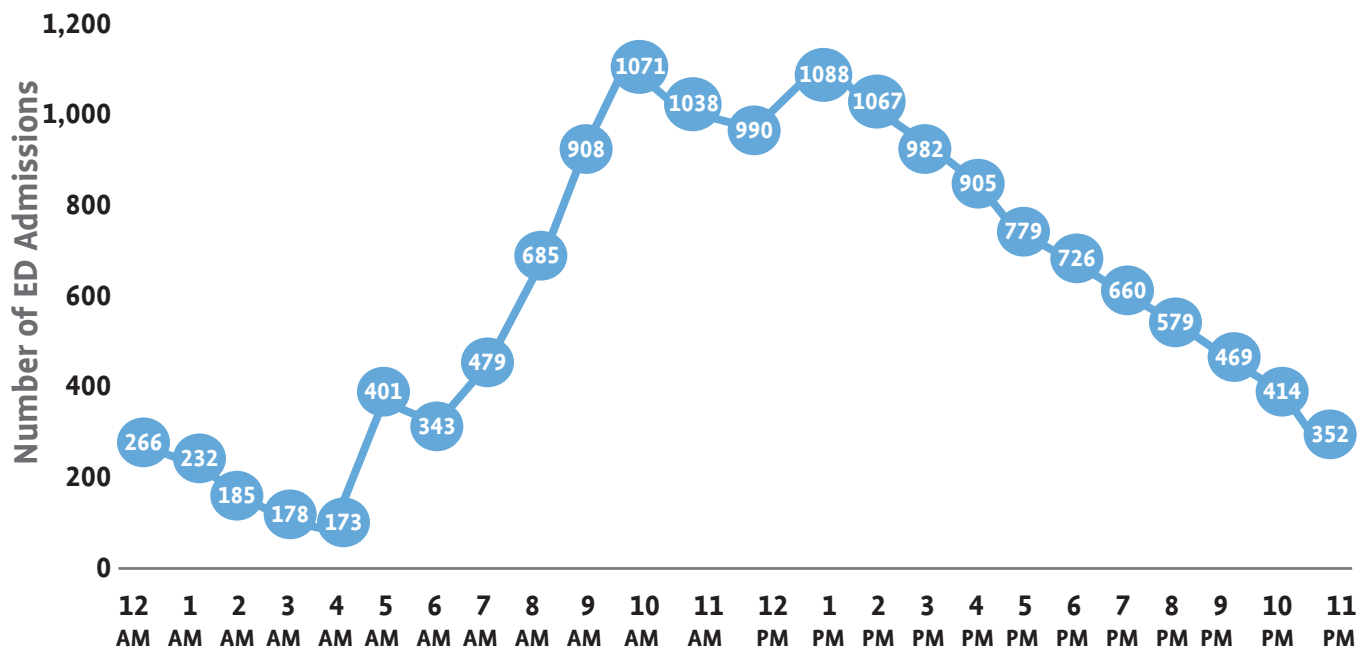
In addition to hospital and ED utilization, another specific area of focus for Tennessee Oncology is the costs associated with patient comorbidities. Analyzing our OCM data, we identified the top four comorbidities from a cost perspective:

1. Chronic obstructive pulmonary disease
2. Congestive heart failure
3. Diabetes mellitus
4. Pain.

For several reasons, these comorbidities, along with several others, proved challenging from an oncology care management standpoint. Sometimes providers are not always aware that patients have a comorbidity and, thus, it is not documented in the electronic health record (EHR)—potentially because patients are not always forthcoming when providing their medical history and/or providers do not routinely test for these conditions. Also, due to our providers' limited knowledge of these conditions, medical management of these conditions is typically referred to or left up to the patient's primary care provider or a designated specialist, if patients have one. Many primary care providers and/or specialists are overwhelmed by patient volume and are unable to see patients in a timely fashion. This situation has been particularly true during the COVID-19 pandemic.

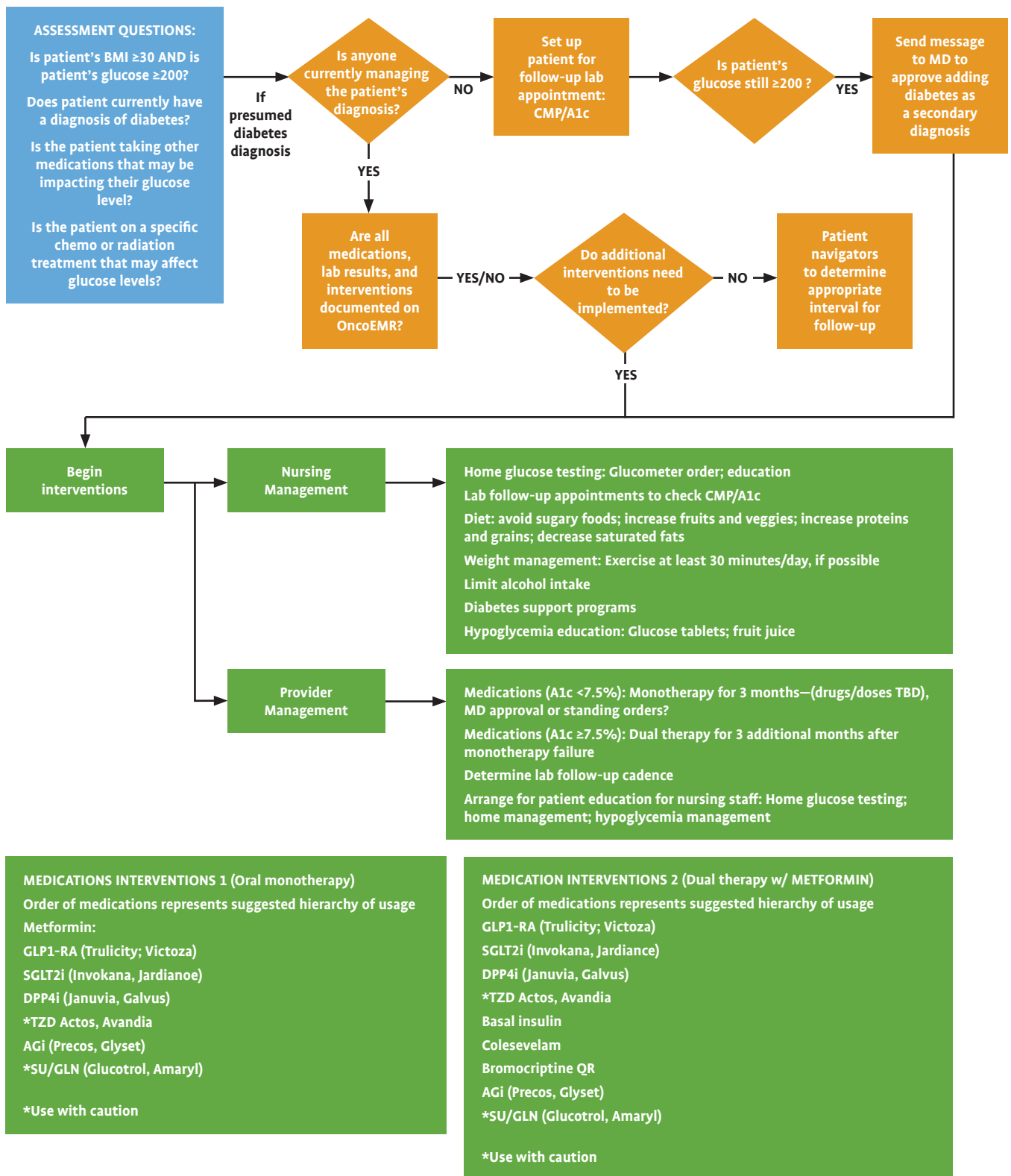
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Figure 3. ED Admissions Trendline by Time of Day (July 9-Oct. 25, 2020)



Note: Data exclusive to Tennessee Oncology; data provided by Tennessee Oncology October 2020; not previously published. ED = emergency department.

Figure 4. Diabetes as a Secondary Diagnosis to Cancer: Comorbidity Management Workflow



Note: This decision workflow is the exclusive work and property of Tennessee Oncology (January 2020). Not previously published. CMP = comprehensive metabolic panel; TBD = to be determined.

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To reduce the time associated with the care management of our patients' comorbidities, as well as the cost of layering additional providers, our practice decided to take on routine management of these comorbidities. To do this, we are building decision algorithms for these four primary comorbidities, which will include clinical support staff pathways as well as provider pathways (see Figure 4, page 67). We are building our own pathways because we have found a surprising lack of resources on patient comorbidity management.

Additionally, we are improving our documentation of these comorbidities in our EHR in several ways. We are identifying secondary conditions that may be related to these comorbidities and documenting these in the EHR. For example, is a patient's blood sugar often high? If so, could we run an additional diagnostic, like an A1c to determine whether the patient has diabetes mellitus?

We are also abstracting physician notes to determine whether other conditions are mentioned in the notes but not documented in the EHR. We are data mining the patient's other provider information to determine whether they see a specialist that might be related to a comorbid condition, like an endocrinologist for diabetes mellitus. We are also pulling data on other lab values, medications, or other discrete fields that may give us insight into other conditions the patient may not have documented. For example, is the patient on a high-dose, frequent prescription for an opioid? If so, the patient may have a chronic pain diagnosis.


In addition to identification of the comorbid illnesses and the algorithms being developed for treatment of the comorbid illnesses, we are implementing a new workflow for patient treatment. If a patient presents to triage or submits a symptom-related questionnaire that identifies a symptom related to a comorbid illness and the patient has been identified in our system as having one of those four comorbid illnesses, the care coordinator or triage nurse will use the staff-level algorithm to care for the patient. If physician intervention is required, the provider will then follow the physician level of the care algorithm. These algorithms include home care for the nurses to relay, as well as prescription guidance for the providers. The algorithms also include appropriate follow-up management for the specific condition.

We will collect data throughout this pilot to compare our primary patient data with their documented comorbid diagnosis data. We will correlate those data with our historic OCM ED/hospitalization data, as well as our new real-time ED/hospital data, to determine whether our management has improved short-term outcomes for patients. We will also collect secondary data to identify improvement in other measurables, like blood sugar/A1c or reduction in pain medication dosage or frequency.

A Look Forward

It appears that healthcare is finally understanding the importance of data, particularly as they relate to patient outcomes. Access to the level of hospital data that we are now contracted to receive will allow Tennessee Oncology an unprecedented vision into ED and hospitalization patterns and allow us to address those findings—proactively and reactively. As we continue to analyze these

data and develop models like risk stratification or disease-specific patterns, the goal is to proactively engage those patients with the necessary care management to reduce, or eliminate entirely, hospital or ED utilization.

By focusing on specific comorbidities that lead to increased ED and hospital visits and increased resource utilization, we hope to reduce healthcare costs. As Tennessee Oncology ventures into two-sided risk in the OCM pilot, the ability to wrap our arms around and control ED and hospital utilization as much as possible will be key to our value-based care success. More important, however, the primary key performance indicator that we will focus on to determine whether our efforts are successful is patient satisfaction. If we can decrease our costs, even slightly, but see a significant increase in patient satisfaction, because we are more attentive, more educated on patients' overall wellness, and more determined to keep them at home, then we will mark these efforts down as a win. 

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