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Michigan Cancer Consortium
Your Michigan Cancer Information Resource

Cancer Survivorship
Rehabilitation and Pain Management

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Prepared by

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Introduction

For cancer survivors—anyone with a cancer history from the time of their diagnosis for the remainder of their life—the disease and its treatment cause a variety of negative physical, emotional, psychological, and financial effects. Cancer-related pain is one of the most common (ACS 2016a) and most feared complications among these patients (Breitbart et al. 2010; Pharo and Zhou 2005). The Michigan Cancer Consortium (MCC) has prioritized the goal of cancer survivor pain reduction, aiming to decrease the percentage of Michigan post-treatment survivors reporting physical pain due to cancer treatment by 10 percent, as reported by *Michigan's Behavioral Risk Factor Survey*, by 2020.

Cancer-related pain is the pain survivors experience from the disease or its treatment even after there is no sign of the disease. While oral pharmacology (i.e., pain medications) can help manage discomfort for many, rehabilitation approaches to pain management—such as physical therapy, occupational therapy, psychological interventions, and interventional pain procedures—can play an important and effective role in reducing pain and improving quality of life (Cascella et al. 2016; Saggini et al. 2015; Glare et al. 2014).

Rehabilitation medicine includes interventions to optimize patients' function despite the persistence of pain (Cheville, Smith, and Basford 2018). These interventions are most effectively delivered using an interdisciplinary approach and are typically led by physical medicine and rehabilitation (PM&R) physicians who follow a biopsychosocial model of care well-suited to addressing pain symptoms (AAPM&R 2018).

Rehabilitation interventions are just beginning to be considered as a standard of care for cancer pain management. Both patients and oncologists may lack knowledge or understanding of the benefits of rehabilitation, and oncologists may not know where to refer patients for pain treatment or feel it is more important to focus on curing the disease itself.

This paper offers an overview of several rehabilitation pain management approaches, methods for determining patient suitability for these interventions, and direction for referring patients to rehabilitation services, as well as profiles of cancer rehabilitation programs in Michigan and case study examples of patients whose pain was effectively addressed through rehabilitation approaches.

The Prevalence and Causes of Pain in Cancer Survivors

Studies have consistently found that one-third or more of survivors experience cancer-related pain before, during, and/or after treatment (Hess 2018; Swarm et al. 2010; van den Beuken-van Everdingen et al. 2016) and two-thirds or more of those with advanced or terminal cancer report cancer-related pain (Hess 2018; Loveday and Sindt 2015; Adam et al. 2015; Swarm et al. 2010). Additionally, approximately 40 percent of all cancer patients in active treatment experience moderate to severe pain (Hess 2018; Fink and Brandt 2018; Adam et al. 2015).

Cancer-related pain is diverse in its incidence and severity. It can be acute, severe, and relatively short-lived; chronic or persistent; or breakthrough pain, which is acute pain that occurs while receiving treatment for chronic pain (ACS 2018). Pain incidence and severity may depend on cancer type, be tumor or treatment-related, or caused by debility or comorbidities, such as arthritis (ACS 2018; Glare et al. 2014; Perez et al. 2016; Moryl et al. 2010; Miguel 2000). There are several biological mechanisms that cause pain, including physical damage caused by cancer or its treatment and psychological characteristics such as anxiety and depression that lead to increased sensitivity of central nervous system neurons (Kumar 2011). Examples of treatment-related pain include: chemotherapy-induced nerve damage; direct damage to neuromuscular and orthopedic structures from surgery; and radiation injury, including radiation fibrosis syndrome (Glare et al. 2014; Stone et al. 2018; Stubblefield November 2011).

The Impact of Pain on Survivors' Quality of Life

The International Association for the Study of Pain defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (IASP 2018). When cancer-related pain is uncontrolled, it can negatively influence survivors' quality of life—as well as that of their loved ones—affecting mood, mobility, sleep, participation in social activities, and ability to work (Swarm et al. 2010; Kumar 2011; Nie et al. 2000; Katz 2002). These symptom clusters—where pain is linked with other diagnoses like fatigue and depression—are common among survivors. These effects may last for many years after cancer treatment ends or never resolve without intervention (Harrington et al. 2010). Studies show that people with persistent pain are four times more likely to suffer from depression and anxiety, and those with cancer-

related pain may be twice as likely to have difficulty working as those without it (Katz 2002). One study reported that 44 percent of participants with cancer-related pain indicated they were unable to work at the time of the study and reported an average of 11 to 19 days each month of being disabled (Brown et al. 2010).

Conversely, survivors whose pain is managed and/or well treated show an improved quality of life and functionality (Katz 2002; Kumar 2011; Nayak et al. 2017). In one study of breast cancer patients, those who were treated for pain experienced improved pain mitigation, emotional and physical functioning, future perspective, and sleep (Puetzler et al. 2014). In another study, those with bone metastases receiving palliative care experienced improved physical functioning (Zeng et al. 2012).

The Interdisciplinary Rehabilitation Team

As pain affects people both physically and emotionally, an interdisciplinary approach that incorporates a variety of providers is considered a best practice in cancer-related pain management (Turk et al. 2010; Turk and Nitu-Marquise 2015; LIVESTRONG 2015; Cancer.Net 2018d). An interdisciplinary rehabilitation treatment team may include the following members:

- Counselors and social workers
- Nurses
- Physiatrists
- Physical, occupational, and recreational therapists
- Primary care physicians
- Psychologists
- Speech and language therapists

Physical medicine and rehabilitation (PM&R) physicians, also called physiatrists, often lead and coordinate care with an interdisciplinary rehabilitation team. The PM&R field of medicine emphasizes prevention, diagnosis, treatment, and rehabilitation from disorders that cause temporary or permanent functional impairment (AAPM&R 2018). As leaders of interdisciplinary rehabilitation teams, physiatrists evaluate and diagnose patients with cancer-related pain and prescribe a range of approaches (AAPM&R 2018). These approaches are mainly patient controlled, largely free of adverse effects, and can be beneficial in the treatment of cancer-related pain in conjunction with pharmacological treatment (Cheville, Smith, and Basford 2018).

Studies show that an interdisciplinary approach to pain management has better outcomes than any single approach, including pain medications alone (Gatchel and Okifuji 2006; Turk 2002; Eccleston et al. 2003). One study of more than 700 end-of-life cancer patients who received individualized treatment planning using an interdisciplinary pain management approach achieved adequate pain control, with most experiencing only mild discomfort in the last six months to one week of life (Peng et al. 2006).

An interdisciplinary approach emphasizes ongoing communication among all providers, the patient, and their loved ones. Research suggests that good communication among and from an interdisciplinary team results in high levels of patient and family satisfaction, improved symptom control, and reduced lengths of stay in rehabilitation programs (Turk et al. 2010; Turk and Nitu-Marquise 2015).

Pain Management Rehabilitation Approaches

Given the high incidence of cancer-related pain and its negative impact on functionality and quality of life, all healthcare providers should be familiar with rehabilitation approaches beyond oral pharmacology and understand why they should refer patients for these treatment approaches, including interventional and nonpharmacological options. Specific approaches may be more suitable for survivors who are receiving cancer treatment, while others may be more suited to those who have completed treatment but still have cancer-related pain.

Oral Pharmacological Approaches

In 1986, the World Health Organization (WHO) developed a three-step laddered guideline for treating cancer-related pain with oral pharmacology using the lowest amounts of nonopioid and opioid pain medication necessary to address patients' discomfort, stepping up the strength of the medication until relief is achieved. Nonopioid, over-the-counter pain medications such as acetaminophen and nonsteroidal anti-inflammatory drugs (e.g., ibuprofen or aspirin), may be effective tools to treat mild cancer-related pain (ACS 2017). These medications also may be used in conjunction with opioids to treat moderate to severe pain (NCI 2018).

Opioids are commonly prescribed for chronic, acute, and breakthrough pain (ACS 2016b). While opioids are an important and effective tool for managing pain, their use needs to be balanced against the risk for misuse and addiction (Glare et al. 2014). In 2016, opioid addiction affected more than two million Americans and

caused approximately 20,000 deaths (NIH 2017), highlighting the importance of alternative pain management approaches.

WHO's pain medication ladder is still used today, and its recommended treatment approach provides adequate relief to 75 to 90 percent of cancer patients suffering from pain (Gupta et al. 2007; Miguel 2000; Grond et al. 1991). However, the WHO ladder does not address treatment for those whose pain is not adequately treated by oral pharmacology or those who experience negative side effects from the medications (Miguel 2000). In addition, those without active cancer may suffer from cancer-related pain for which opioid therapy is not generally effective (Ballantyne 2003). And, while the majority of cancer survivors with pain respond well to nonopioid or opioid oral medications, up to two in ten survivors do not (Loveday and Sindt 2015; Perez et al. 2016).

Interventional Pain Management

Interventional approaches to cancer pain management include the delivery of pain medications through injections, pumps, and neuromodulation, which impairs a nerve's ability to send pain messages to the brain (PPM 2018). These approaches are sometimes used with cancer patients suffering from focal pain and those who have had inadequate pain control or adverse effects from oral pharmacological treatment (Glare et al. 2014). There are several types of interventional options that rehabilitation physicians may be able to perform and prescribe, including steroid injection nerve blocks, neuromuscular blockade for spasms, dry needling, neurostimulation therapy, neuraxial analgesia, electrothermal therapy, and cryogenic cooling, which can be used for treating different types of cancer-related pain. For example, celiac plexus nerve blocks can treat abdominal visceral pain common in pancreatic cancers, and superior hypogastric plexus blocks can be used to treat pelvic pain from cancers of the uterus, cervix, ovaries, prostate, bladder, and rectum (Merkow and Varhabhatla 2018). Less invasive injections include intercostal blocks for postmastectomy pain.

When compared with treatment using oral pharmacology, interventional approaches have been shown to improve pain control and patient function, increase survival, reduce adverse side effects and opioid use, improve quality of life, and potentially lower costs for long-surviving patients (Lampner 2016; Sindt and Brogan 2016; Miguel 2000). Additionally, a cross-sectional study of patients from a sample of 137 individuals treated using interventional approaches found support for the efficacy of these treatment options for several types of cancer-related pain (Minson et al. 2012).

Nonpharmacological Approaches

There are also many nonpharmacological rehabilitation interventions that can be used to alleviate pain caused by different types of cancers and/or cancer treatment. These include physical therapy, occupational therapy, psychological interventions, the use of orthotics and assistive devices, speech and language therapy, and alternative cancer pain management approaches (Cascella et al. 2016; LIVESTRONG 2015; Cancer.Net 2018a; Hojan and Milecki 2014; Glare et al. 2014; Bhatnagar 2009). These approaches are typically led by physiatrists and carried out by interdisciplinary team members, as well as others, such as those who provide complementary and alternative therapies.

Physical Therapy

Physical therapy is commonly prescribed for cancer survivors as a noninvasive pain management technique (Glare et al. 2014). By treating pain through strengthening, stretching, and restoring neuromuscular control of muscles, physical therapists can play a major role in reducing pain and optimizing patient function (Kumar 2011).

Research confirms the efficacy of physical therapy for treating pain (Balamurugan and Hariharasudhan 2015; Ginnerup-Nielsen et al. 2015). A study of 30 breast cancer patients with arm and shoulder pain found that standardized physical therapy, including advice and exercises, reduced their mean visual analog scale (VAS) pain score by 3.8 points, from 4.7 to .9 after six months of treatment—where a VAS score of zero equals no pain, and a score of ten equals unbearable pain (Beurskens et al. 2007). Another study of 44 breast cancer patients found that an eight-week program of physical therapy—which included 24 hours of individual physical training and 12 hours of physical therapy recovery—improved neck and shoulder discomfort (Fernández-Lao et al. 2012). A randomized clinical trial of 24 advanced terminal cancer patients found that a combination of massage and exercises reduced pain and improved mood (López-Sendín et al. 2012). In addition, researchers found that use of physical therapy modalities, including manual lymphatic drainage, massage, exercises, patient education, and compression therapy, significantly reduced lymphedema (swelling) and pain in head and neck cancer patients (Tacani et al. 2014).

The specific physical therapy intervention can be established on the mechanism-based classification of the individual survivor's pain (Kumar 2011). For example, complete decongestive therapy has been shown to be effective in patients with nociceptive-mechanism-based pain (Hamner and Fleming 2007; Cassileth and Vickers 2004; Puthusseril 2006; Liu and Fawcett 2008; Kutner et al. 2008).

Occupational Therapy

Occupational therapy enables patients to participate in daily activities despite physical or mental limitations. Occupational therapists help modify patients' daily activities and environment to allow them to resume their routines and maintain their quality of life while also building perceived personal control in managing pain and discomfort (AOTA 2011; Cascella et al. 2016). Occupational therapists provide pain management by: actively listening to the patient to learn about their background, needs, fears, and beliefs; educating the patient to improve their knowledge and capacity to take an active role in their pain management; intervening with preventive measures before pain worsens or becomes chronic; problem-solving to resolve obstacles to proper pain management; and facilitating opportunities for experiential, hands-on learning (Lapointe 2012).

Although research is limited, there is emerging evidence that occupational therapy can be used to effectively treat cancer-related pain. For example, one study of an occupational therapy program in which therapists assisted patients with chronic pain in acquiring health-promoting habits and routines in daily life showed improvement in patient pain self-efficacy (Uyeshiro Simon and Collins 2017). Another study found that occupational therapy for chronic low back pain treatment using a biopsychosocial approach was more effective than usual care (generally involving pain medication and physical treatment) to reduce pain intensity (Ho and Argáez 2017). Occupational therapists may also perform decongestive therapy for lymphedema management.

Psychological Interventions

There is a strong link between cancer-related pain and mood, distress, depression, and anxiety, making it important for psychological interventions to be considered in treatment plans. Emotional distress is frequently associated with cancer-related pain; however, positive emotions can help manage pain (Ogbeide and Fitch-Martin 2016). Additionally, cancer patients' confidence about their ability to control their pain has been shown to decrease discomfort (Zaza and Baine 2002; Bishop and Warr 2003), and systematic reviews and meta-analyses found that psychological and behavioral therapies can significantly reduce cancer-related pain severity and interference (Gorin et al. 2012; Syrjala et al. 2014; Abernethy et al. 2006).

Cognitive behavioral therapy (CBT) is perhaps the most common psychological intervention used to treat chronic pain. CBT's core principle is teaching patients strategies to better manage their discomfort through stress management, pain education, as well as training and practice in coping skills (Ogbeide and Fitch-Martin

2016; Turk et al. 2008; IASP 2008a). CBT strategies include educating the patient to reconceptualize the significance of pain, problem solving, goal setting, and relaxation techniques (Ogbeide and Fitch-Martin 2016). Both comprehensive (employing multiple strategies) and brief CBT have led to successful outcomes in treating cancer-related pain (Stannard et al. 2010).

Orthotics

Orthotics and assistive devices can compensate for weakness by reducing stress and discomfort on a painful area of the body while still enabling the area's functioning (Borda et al. 2014; Bruera and Portenoy 2010). For example, extremity orthoses, like an ankle or foot brace, will hold the limb in the position of function, which can provide relief, improve safety, and reduce fatigue (Bruera and Portenoy 2010). Spinal orthoses can be used to unload a fractured vertebrate caused by certain types of cancer, including bone metastases and multiple myeloma (Highsmith 2018).

Speech and Language Therapy

Speech and language therapy generally focuses on language comprehension, expression, and swallowing. Patients suffering from certain cancers, mainly those of the neck or head, may experience ongoing pain that will respond to this type of therapy, helping them regain their speaking, swallowing, and oral motor skills (Cancer.Net 2018b). Speech and language therapy exercises can also help treat the discomfort of trismus—commonly referred to as lockjaw—which can be an effect of radiation-induced fibrosis (Clarke et al. 2016). Additionally, speech therapists can aid in a patient's pain assessment, as they are often the first to identify nonverbal communication signs and symptoms (Tristani and Lafrenz 2017).

Complementary and Alternative Interventions

Cancer-related pain can also be treated using complementary and alternative interventions, including acupuncture, massage therapy, and mindfulness interventions, such as meditation and yoga. (Pfister et al. 2010; Schroeder et al. 2012; Bao et al. 2011; Cassileth and Vickers 2004). These interventions are often used in addition to traditional rehabilitation approaches and are generally conducted outside of the treatment team. A recent systematic review and meta-analysis of acupuncture for cancer pain management found that acupuncture plus drug therapy resulted in increased pain remission, faster relief, longer duration of analgesic time,

and improved quality of life (Hu et al. 2016). Similarly, a meta-analysis of massage therapy—including body massage, aroma massage, and foot reflexology—for cancer pain treatment showed that it was significantly effective in reducing discomfort (Lee et al. 2015).

There is also some evidence that mindfulness interventions can reduce cancer-related pain. Mindfulness is grounded in awareness of one's present moment and posits that an attitude of openness and acceptance of one's experience is critical (Creswell 2017). One such intervention—mindfulness-based cognitive therapy—showed statistically significant effects on pain intensity in a study of 129 women with breast cancer being treated for posttreatment pain (Johannsen et al. 2016). Another study showed significant reduction in scores for pain catastrophizing, anxiety, and pain ratings, along with a positive change in their expectations of pain as a result of mindfulness-based stress reduction interventions (Tacón 2011).

Patient Education in Pain Management

Education about the potential negative effects of cancer and its treatment plays an important role in patients' ability to manage the pain they experience during and after treatment. After diagnosis and before treatment starts, providers have an opportunity to prepare patients for the types of side effects they can expect, including pain. Patient education should include discussion of rehabilitation treatment options, such as occupational and physical therapy as well as psychological interventions, which may empower self-management (Mann et al. 2013).

Cancer pain education has been shown to: decrease pain intensity and its interference in daily life as well as barriers; decrease depression severity; increase patient communication and knowledge about pain; enhance coping skills; and increase patient adherence to providers' instructions for taking medications (Kravitz et al. 2011; Kroenke et al. 2010; Oldenmenger et al. 2011; Thomas et al. 2012; Smith et al. 2010; Martin et al. 2012).

Patient education should be designed to address patient needs throughout the cancer care continuum as their experiences vary across the intervention stages. For example, it is important to continue education after patients begin treatment, which often compromises the ability to process and retain information (Pendergrass et al. 2018; Cancer.Net 2018c). These patients are often concerned about addressing pain with their provider because they do not want to take the focus off of the treatment (Miller, et al. 2009; Oldenmenger et al. 2009; Vallerand et al. 2007).

Programs designed for patients in this stage of care, therefore, should allow for repetition of information and offer reassurances that cancer treatment and symptom management can coexist (Martin et al. 2012). Once primary treatment is complete, pain education should again address the understanding of chronic pain symptoms and provide guidance on when survivors should seek care (Martin et al. 2012). Finally, near the end of life, educational interventions need to be of low burden and take effect quickly (Bennett et al. 2009).

Patient education at the time of diagnosis could include information about prehabilitation, which occurs between the time of diagnosis and the beginning of treatment. Prehabilitation includes physical and psychological assessments that establish a baseline functional level, identify impairments, and provide interventions, such as presurgery exercise training, to reduce the incidence or severity of future impairments (Silver and Baima 2013; Singh et al. 2013). Although research studies are limited, prehabilitation may improve both physical and psychological outcomes and help patients function at a higher level throughout treatment (Silver 2015).

Referring Cancer Patients for Rehabilitation

It is essential that patients receive early and ongoing access to rehabilitation approaches to effectively treat cancer-related pain. While there are several cancer rehabilitation programs in Michigan, many survivors may not have access to or are not referred to these programs by their oncologists. It is important to identify those who would benefit from these interventions and connect them with a program soon after diagnosis.

Identifying Patients Who Would Benefit from Rehabilitation for Pain Management

The key to successful pain management through rehabilitation is an early and accurate diagnosis through a detailed clinical assessment. This assessment should include a thorough patient history and physical exam and may involve electrodiagnostic testing (Glare et al. 2014; Fink and Brant 2018; Stubblefield June 2011). Pain screening should be conducted for all cancer patients during their initial evaluation; follow-up screenings should also be conducted at regular intervals and whenever a new treatment therapy is initiated (Swarm et al. 2010).

Patients who report new, uncontrolled, or distressing pain should receive a comprehensive assessment that focuses on the pain type, intensity, history, location, referral pattern, and radiation; factors that exacerbate or relieve the pain; functional impairment; psychological associated factors and psychosocial history; and the pain management plan and therapies currently or previously used (Saggini et al. 2015; Swarm et al. 2010; Fink and Brant 2018). This assessment can be accomplished through a patient interview, physical examination, and radiographic imaging of the affected location (Saggini et al. 2015). Common assessment tools include pain intensity scales, such as a VAS; multidimensional instruments, like the Brief Pain Inventory; and symptom assessment tools, such as the Edmonton Symptom Assessment Scale or the M.D. Anderson Symptom Inventory (IASP 2008b).

When oncology offices do this type of assessment, they can more easily identify patients who would benefit from rehabilitation. For example, the Cancer and Hematology Centers of Western Michigan (CHCWM) uses navigators and survivorship nurse practitioners in their oncology practice to assess patients' treatment needs. When indicated, these navigators and nurse practitioners refer patients to the Cancer Rehabilitation Program at Mary Free Bed Rehabilitation Hospital in Grand Rapids, Michigan, and oncologists refer for neuropathic pain. Some patient conditions that are commonly referred for rehabilitation include peripheral neuropathy caused by chemotherapy agents used to treat a variety of cancers, as well as arthritic pain related to endocrine therapy in breast cancer patients.

After identifying a patient who would benefit from rehabilitation for cancer-related pain, it is important to determine if the patient is likely to experience barriers to accessing the treatment. Common patient challenges include, lack of transportation and high out-of-pocket costs. Patients may also believe that these approaches are ineffective, or they may lack support from providers and family to address their symptoms (Becker et al. 2017). Providers should work with patients and the rehabilitation team to address these barriers.

Michigan Program Profiles

Profiles of several Michigan-based cancer rehabilitation programs are provided below. These profiles include information on how patients are identified and referred to the program, the types of providers on the rehabilitation team, and how those providers communicate with one another. They also include how the appropriate rehabilitation treatment approach for each patient is identified and how the team carries out the approach. Information on the role of patient education, barriers that prevent participation in recommended rehabilitation approaches, and participant feedback is also provided.

Betty Bloomer Ford Cancer Rehabilitation Program at Mary Free Bed Rehabilitation Hospital

The Betty Bloomer Ford Cancer Rehabilitation Program in Grand Rapids, Michigan, is accredited for both acute inpatient and outpatient cancer rehabilitation. The program focuses on managing impairments that interfere with functioning and living meaningfully. The program works closely with the oncologists and navigation teams at the Cancer and Hematology Centers of Western Michigan (CHCWM) and other comprehensive cancer clinics to identify common pain syndromes associated with different cancer types and assist the CHCWM navigation team in better identifying patients who would benefit from a rehabilitation approach to pain management. Program staff are available to answer questions from the navigation teams to triage patients or recommend the best approach.

A cancer rehabilitation program physiatrist simply may evaluate referred patients to diagnose the source of pain, or they also may actively participate in cases that require more medical management and involve multiple disciplines. Depending on specific patient needs, the rehabilitation team may include a physical therapist, an occupational therapist, a speech and language pathologist, a psychologist, a social worker, nurses, and a recreational therapist. The rehabilitation team identifies the appropriate rehabilitation treatment approach with assistance from the oncology team and is based on the interventions the patient received (e.g., surgery, radiation, or chemotherapy) and the tumor type. The most common primary diagnoses among referred patients are cancers of the breast, head and neck, and colon. Once the rehabilitation team identifies a treatment approach, the team meets every two weeks to review the patient's progress and change the approach if necessary.

Betty Bloomer Ford Cancer Rehabilitation Program staff believe that patient education plays an important role in pain management by helping the patient understand what pain is and what causes it. This understanding may help minimize catastrophizing. Patient education also helps patients understand how to best reduce and manage pain with what they have learned in therapies. Program staff notes that barriers to participation in these interventions include financial burdens, excessive medical appointments, and a lack of understanding of the value of this approach to pain management. Staff tries to address these barriers by educating oncology teams on the benefits of rehabilitation approaches to treat cancer-related pain and by reviewing treatment costs and insurance coverage with patients before the appointment.

Staff collects patient assessment data using a zero to ten pain scale, the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-Chemotherapy-induced Peripheral Neuropathy 20-item Scale, and range of motion assessments. They report excellent patient feedback with reduced pain and better self-management.

Starting in January 2019, this program will be integrated with the CHCWM oncology survivorship clinic by being onsite to see patients for physiatry and comprehensive therapy services.

Michigan Medicine—Ann Arbor

Oncologists refer patients to Michigan Medicine's cancer rehabilitation program to help them manage functional impairments, which include pain, fatigue, weakness, and cognitive deficits. Most referrals come through Michigan Medicine's electronic medical record (EMR) system, but patients can also self-refer. Oncologists learn about program services through outreach and education efforts from program staff, former patients who share their experiences, and by word of mouth from other oncologists.

Generally, Michigan Medicine's PM&R physician directs the care team, manages referrals, and coordinates care among rehabilitation providers. For inpatients, the team communicates using EMR, email, and twice-weekly team meetings. Michigan Medicine provides tailored rehabilitation services based on individual patient symptoms, tumor stage, previous treatment, and functional capacity. The team most often treats those diagnosed with cancers of the breast, head and neck, and brain, sarcoma, gynecological cancers, and those who have received bone marrow transplantations.

Patients receive both pharmacologic and nonpharmacologic treatment. The Michigan Medicine Cancer Rehabilitation program takes an anatomic approach to pain, striving to remove pain generators whenever possible through targeted exercise and/or interventional pain procedures. Depending on patient needs, the PM&R physician may refer patients to a physical therapist, an occupational therapist, or others. Often, nonpharmacologic approaches to pain management are preferred due to their sustainability.

Patient education plays a significant role in patient buy-in to a treatment program and can minimize catastrophizing of pain, which reduces overall stress and the risk of pain becoming centralized. Some barriers to program participation include an overload of medical appointments and treatment costs, as patients may already be paying out-of-pocket costs for treatment of the cancer itself.

Michigan Medicine staff reports that patient feedback is generally very positive, with many preferring the holistic approach and reporting it was the first time their symptoms have been addressed.

Beaumont Oncology Rehabilitation Program

The oncology rehabilitation program at Beaumont Health is part of the health system's Cancer Survivorship Program. This program includes several disciplines to support the needs of the cancer survivor, including a nutritional program, integrative medicine, psychosocial support programs, and rehabilitation and wellness programs. Beaumont's cancer-specialist rehabilitation professionals are stationed at Beaumont locations throughout Metro Detroit.

Utilizing prehabilitation concepts, Beaumont Health proactively screens cancer patients with an integrated interdisciplinary referral model. The entire cancer care team, including rehabilitation professionals, frequently assesses patients for cancer-related pain or dysfunction from initial diagnosis through cancer remission. Early identification of established or potential causes of pain is critical to limit delays or unwarranted modifications to the cancer treatment protocol or unwarranted use of opioids.

The oncology rehabilitation program receives direct referrals from medical and radiation oncologists, surgeons, PM&R physicians, nurse navigators, and multidisciplinary clinics, as well as patient self-referrals. Physical therapists attend several tumor boards and are stationed at multidisciplinary cancer clinics to provide early pain identification and direct referral for rehabilitation services at any point in the patient's cancer journey. Beaumont Health provides its oncologists with

education and information on the benefits of rehabilitation for cancer survivors, which has forged a trusting and collaborative relationship among the rehabilitation team and the medical community.

The rehabilitation team consists of a physical therapist, occupational therapist, speech language pathologist, and recreational therapist. The rehabilitation team communicates via regular meetings, EMR, emails, fax, and phone. The physical therapist often initiates care by screening for pain, functional impairments, and edema. The therapist's assessment is tumor-specific, with the most common tumors being those of the breast, gynecological, gastrointestinal, genitourinary, lung, head and neck, and brain. Once the physical therapist identifies the appropriate approach, they provide diagnosis-specific education on prevention and sustainable wellness. Patients are instructed to join a prehabilitation fitness program or start formal physical therapy. Program staff stress the importance of exercise and other nonpharmacological approaches to pain management, including integrative medicine. The occupational therapist concentrates on function, energy conservation techniques, and ergonomics and occupational activities and offers education and treatment with an emphasis on safely performing activities of daily living and work reintegration. The speech and language pathologist educates patients and treats them for swallowing and speech impairments. Additionally, Beaumont therapists work closely with the palliative care and hospice team to provide pain control and optimize quality of life in advanced cancer or terminal scenarios.

One barrier that limits participation is a lack of knowledge by both physicians and patients about the role and benefits of oncology rehabilitation services. Physicians may not be aware of oncology rehabilitation services or do not consider rehabilitation's role in managing cancer pain via nonpharmacological means. Additionally, managing issues related to side effects of cancer or its treatments may inadvertently be delayed due to the focus on treatment. The team at Beaumont emphasizes early intervention of these side effects and symptoms to minimize dysfunction and impairment. Other barriers include limited insurance coverage for prehabilitation and limited patient access to facilities with a comprehensive oncology rehabilitation program.

Beaumont Health collects patient assessment data using the Functional Assessment of Chronic Illness Therapy Fatigue, which assesses fatigue and physical, functional, and psychosocial and emotional domains of quality of life. In addition, pain response is monitored through pain scale questionnaires such as the Mankoski guidelines and patient-reported functional outcomes.

Ascension Michigan Physical Therapy—Macomb Township

Ascension Michigan Physical Therapy in Macomb Township receives referrals from radiation oncology clinics and multidisciplinary clinics based on their oncology rehabilitation screenings. Physical therapists educate physicians on the benefits of oncology rehabilitation for the prevention and mitigation of pain and other side effects from cancer treatments, which helps increase patient referrals for whom pain is the primary complaint. Physicians more commonly refer patients for weakness, fatigue, or other musculoskeletal deficits, but there are many patients who could benefit from therapy for pain relief, even without the presence of primary musculoskeletal issues.

Physical therapists primarily provide treatment in an outpatient setting. The rehabilitation team views effective communication (through email and Skype) and ongoing staff development as essential to successful patient treatment. Team members participate in a monthly journal club to network and review current evidence for enhancing clinical practice, as well as monthly committee meetings where they identify and discuss opportunities for program growth and development.

Patient and physician education are paramount to every aspect of rehabilitation interventions, as knowledge empowers the healing process — psychologically and physically. A major barrier to referrals is that rehabilitation is just beginning to be considered as a standard of care in cancer management. While physicians and mid-level providers at Ascension are beginning to embrace this change and promote the benefits and safety of exercise, they sometimes feel their patients cannot fit physical therapy into their treatment regimen due to multiple medical appointments.

The center's therapists and regional clinicians collect data using the VAS, which can be extracted and used from their EMRs. Additional patient data is collected through exit surveys; patients report positive experiences and note feeling empowered by Ascension's rehabilitation approaches.

Case Studies

The following are case studies of rehabilitation interventions used to treat and manage cancer pain in patients with various types and stages of cancer and varied symptom expression. Details of patients described in the case studies have been modified or suppressed to protect individual patient identity.

Case Study #1—Breast Cancer and Postmastectomy Pain Syndrome

Medical oncologist referred the patient to Physical Medicine and Rehabilitation (physiatry) for evaluation and management of chest wall, axillary, and shoulder pain in a patient with a history of breast cancer. She had completed a unilateral mastectomy with immediate flap-based reconstruction, chemotherapy, and whole-breast radiation over seven months ago. Her pain symptoms had gradually worsened since completing radiation therapy and consisted of a cramping sensation in her chest wall, pain in her shoulder with overhead movements, and burning pain in her midaxillary line at the breast level. Due to her symptoms, she had been unable to work.

On physical exam, she had tenderness and a Tinel's sign at her midaxillary line at the T5 and T6 vertebrae levels. There was numbness throughout the axilla. Her shoulder exam was remarkable for decreased extension range of motion and abduction/internal rotation-caused pain (positive Hawkins test). She had tenderness over the origin of the pectoralis major. The shoulder joint itself was not enlarged or abnormally warm, although she did have midaxillary superficial skin changes from radiation.

Based on the physiatrist's evaluation, the patient was diagnosed with a pectoralis spasm, lateral cutaneous intercostal neuralgia, and rotator cuff impingement. The rehabilitation plan consisted of an exercise program provided by the physiatrist to engage rotator cuff musculature and stretch the pectoralis complex and topical analgesics for the cutaneous nerve pain. These exercises were prescribed as a home exercise regimen.

In the two-month follow-up appointment, her shoulder pain was relieved, she had a 50 percent reduction in midaxillary pain, but also had unchanged pectoralis spasms and reduced shoulder extension range of motion impacting her ability to return to work. She was prescribed a nerve-stabilizing agent, gabapentin, for her neuropathic pain and spasms. Should this not reduce her symptoms, injection of botulinum toxin to the pectoralis major muscle was discussed as a viable option in the future for relief of her spasm and intercostal nerve blocks for her midaxillary pain. Patient's insurance provider authorized payment for therapy costs based on policy.

Note: If botulinum injections are prescribed, will need to obtain prior authorization of coverage from insurer.

Pain Generators	Diagnosis	Treatments
Intercostal nerves	Lateral cutaneous intercostal neuralgia	• Topical analgesics • Oral analgesics • Intercostal nerve blocks
Shoulder musculature	Rotator cuff impingement	• Exercise program
Pectoralis muscles	Pectoralis major spasm	• Exercise program • Oral analgesics • Botulinum toxin injection

Case Study #2—Head and Neck Cancer Patient

Medical oncologist referred a patient with diagnosis of squamous cell carcinoma on the right-side of the tongue for evaluation and symptom management of pain by physical therapy. The patient has completed surgical resection, consisting of right hemiglossectomy with right cervical lymph node dissection to remove the carcinoma lesion involving the anterior two-thirds of his tongue. He completed radiation treatments to the head and neck region and chemotherapy. Patient developed head and neck pain related to lymphedema and radiation fibrosis following surgery and radiation treatments.

At three weeks postradiation, patient was evaluated by the Physical Therapist to address pain in the head and neck region. At initial visit, patient stated pain was worse on the right-side of the neck than on left-side. He rated his pain at a level of 8-9/10 (zero = no pain; ten = worst pain) on the VAS. He took a maximum of seven Norco five mg/325 mg tablets/day for pain control. Pain limited performance of daily household tasks and sleep.

On examination he had moderate fibrosis throughout the left lateral neck and the upper and middle anterior neck regions. The patient also noted fullness within the cheek area. On examination, multiple areas of tissue trauma were visualized within the right cheek evidencing bite marks into the tissue. He also noted difficulty with swallowing and needed liquids to assist getting food to move through the pharynx and esophageal regions — a strategy he had learned from a Speech Language Pathology therapist.

Patient was seen five times a week for 2.5 weeks for a total of 13 sessions. Treatment included complete decongestive physiotherapy regimen which included manual lymph drainage (MLD) by the therapist as well as training patient to carry out self-MLD, which included: (a) intraoral technique to affect the swelling of the oral tissue into his bite path, (b) exercises to enhance lymph flow, (c) fitting with a

nighttime compression garment, (d) education on infection prevention, (e) education on skin care in presence of lymphedema, and (f) follow-up care instructions. Manual therapy to decrease the impaired skin mobility associated with the radiation fibrosis was also performed with manual techniques as well as use of the Lymphatouch® (LymphaTouch Inc, Kuortanenatu 2, 00510, Helsinki, Finland) negative pressure treatment to mechanically stretch the tissues and enhance lymph drainage. Improvements in cancer pain level, sleep hygiene, and range of motion deficits at discharge were noted as follows:

Deficit	**PT Initial Visit**	**PT Discharge Visit**
Visual Pain Scale	Pain level at 8-9/10	Pain level at 2-3/10
Pain Medication Usage: Opioid/Nonopioid	**Opioids:** Norco 5mg/325mg maximum of 7 tablets over 24 hours; **Nonopioids:** None	**Opioids:** None **Nonopioids:** Tylenol 325 mg/tablet; Maximum used: 4 tablets over 24 hours
Maximum Number of Hours of Undisturbed Sleep due to Pain/Night	4 hours	7-8 hours
Cervical ROM Left lateral (side) bend	14 degrees	26 degrees
Cervical ROM R rotation	27 degrees	35 degrees
Cervical ROM Left lateral (side) bend	14 degrees	26 degrees
Neck fibrosis	Moderate, less than 0.25 cm skin movement.	Skin movement at least 0.75 cm.
Skin integrity Left side oral region of mouth cavity	Reported frequently biting cheek, multiple areas of tissue trauma noted on inspection.	Pt. reported not biting cheek in last 5 days. Inspection evidenced trauma areas were almost fully healed.
Swallowing	Only able to swallow solid foods with assist of fluids.	No need for fluids to swallow most foods now.
Head turning	Reports difficulty turning head for checking traffic/pedestrians when driving.	Reports increased ease of checking for pedestrians and traffic when driving.

Case Study #3—Breast Cancer Patient with Pain and Balance Issues

A patient with a history of cancer of one breast treated with modified radical mastectomy, chemotherapy, and radiation was referred by the medical oncologist for physical therapy evaluation and management of balance and pain issues related to chemo-induced peripheral neuropathies (CIPN). She reported having constant numbness and burning pain in her toes, feet, and occasionally, in her finger tips. She rates her pain level at 5–6/10 (zero = no pain; ten = worst pain possible) on the VAS. She takes regular strength Tylenol as needed for pain relief. She reported having had two falls since finishing chemotherapy. She reports experiencing pain involving the joints and muscles of bilateral upper and lower extremities since starting aromatase inhibitor (AI) (i.e., Arimidex) daily maintenance therapy.

She reported moving much slower overall and has to hold onto objects when ambulating because she feels like there are balls under her feet. She previously worked full time and participated in recreational activities. A fear of falling has limited those activities. Additionally, she complained of chemo-related fatigue which was constant and not relieved with rest.

Significant evaluation findings are noted in chart below as well as improvements seen at discharge. Treatment included a trial of transcutaneous electrical nerve stimulation (TENS) with glove and stocking types of electrodes for pain control, which she had a positive response to. She elected to get a home unit and was trained for independent home use of TENS therapy. Treatment also included balance training focusing on facilitation of use of vestibular information to initiate balance reactions. Dynamic balance was also progressed through ambulation activities involving head motion, various unlevel surfaces, and increasing toward functional speeds of ambulation during these activities. Motion-provoked vertigo symptoms were treated with habituation exercises, which responded to daily home program activities. Patient was educated in a trekking pole cardiovascular walking program with a pedometer, five times per week. Her initial average daily steps were measured over the first three days of treatment and goals were established to increase daily steps by ten percent each week. She has had no further falls and does not need support with home or community ambulation.

Deficit	PT Initial Visit	PT Discharge Visit
CIPN pain feet and hands: numbness, prickling, burning sensations reported.	VAS Level (patient self-reported): 5 feet-constant 6 in hands, but more intermittent when tired	VAS Level (patient self-reported): 0 after TENS use which tended to last for 2-4 hours after 30-minute application.
Pain Medication Usage: Opioid/Nonopioid	**Opioids:** None **Nonopioids:** Tylenol 325 mg, Maximum used: 8 tablets over 24 hours.	**Opioids:** None **Nonopioids:** Tylenol 325 mg, Maximum used: 2-4 tablets over 24 hours
*Neurocom Balance Manager Sensory Organization Test Vestibular Condition sway score (Natus Inc., Pleasanton, CA)	31% of age matched normal average score	87% of age matched normal average score
*Neurocom Balance Manager Sensory Organization Test overall equilibrium score	64% of age matched normal average score	99% of age matched normal average score
*Motion provoked dizziness: side-lying to sit, sit to supine, head turning x 5, head nodding x 5	2-3/5	0/5
Average steps/day pedometer	1124	4077
Boston University Acute Measure for Post-acute Care (AM-PAC) score High Level PT version	T-scale score=57.98; functional limit score=43.86% impaired	T-scale score=66.43; functional limit score=27.25% impaired

*Note: Programs that do not have the Neurocom Balance Master technology for Somatosensory Organizational Testing can substitute the Berg Balance, 6-Minute Walk, and 10-Meter Walk Tests.

Case Study #4—Uterine Cancer Patient with Pain

A patient with history of uterine cancer that was treated with surgery (total abdominal hysterectomy and bilateral salpingo-oophorectomy), chemotherapy, and radiation, completed three years ago. She presents for physiatry evaluation with a chief complaint of chronic low back pain that radiates to the lateral hips. She failed to find pain relief from previous physical therapy, muscle relaxers, and NSAIDs (nonsteroidal anti-inflammatory medications). She rated her pain at 7/10 on the VAS. She also reports constipation, dyspareunia, and mixed urinary incontinence.

Physical exam of the lumbar spine and hips did not reveal any neurologic or orthopedic concerns. Abdominal exam was benign. On inspection, vulvar tissue was friable with signs of estrogen deficiency. Pelvic floor exam revealed pain at the introitus and diffuse tenderness to the layer one musculature. Internal trigger points were noted in the obturator internus bilaterally, which reproduced her pain. Trigger points were also found in the puborectalis muscle. Pelvic floor strength and coordination were decreased. She was diagnosed with high tone pelvic floor dysfunction thought to be related to her previous pelvic and abdominal surgeries and radiation. She was prescribed a course of pelvic and abdominal physical therapy and given education on vulvar tissue health. She was screened for mood contributors to her chronic pain and scored in the mild to moderate range on the Generalized Anxiety Disorder-7 (GAD-7) Scale and Patient Health Questionnaire-9 (PHQ-9) Depression Scale. Cymbalta was discussed as an effective medication for mood, neuropathic, and chronic pain, but was deferred by the patient.

Her physical therapy entailed initial pelvic floor relaxation strategies including diaphragmatic breathing, mindfulness, and Surface Electromyography (SEMG)-assisted biofeedback to decrease high pelvic floor tone and help bring awareness to tight musculature. Patient scored 18/33 (55 percent functional limitation) on the Vulvar Pain Functional Questionnaire (VQ) and 38/50 (78 percent disability) on the Modified Oswestry Low Back Pain Questionnaire (ODI). Treatment also included the following: gentle stretching routine for low back, hips, and lower extremities; manual therapy to address trigger points in the obturator internus and puborectalis muscles; gentle and progressive home dilator program; urge suppression techniques for urinary urgency and incontinence; constipation massage to improve stool motility as well as education on adequate fiber and water intake to improve stool consistency; and education on proper toileting positions to improve bowel passage and reduce potential for straining.

At her six-week physician follow up, she had progressed to using the small dilator. Pain was significantly improved with daily activities, but she verbalized a goal to return to sexual activity. Vaginal compounded valium was prescribed. Physical therapy interventions included progression of home dilator program, relaxation strategies, stretching, as well as ongoing education about lubrication options and restoring vulvar tissue health.

At her one-year physician visit, pain was no longer limiting sexual activity and she was able to resume a fulfilling sexual relationship. Her VQ score improved to 6/33 (18 percent functional limitation) and ODI improved to 7/50 (14 percent dysfunction). She was pleased with her progress.

Attachment A: Michigan Cancer Consortium Survivorship Workgroup Subcommittee Members

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