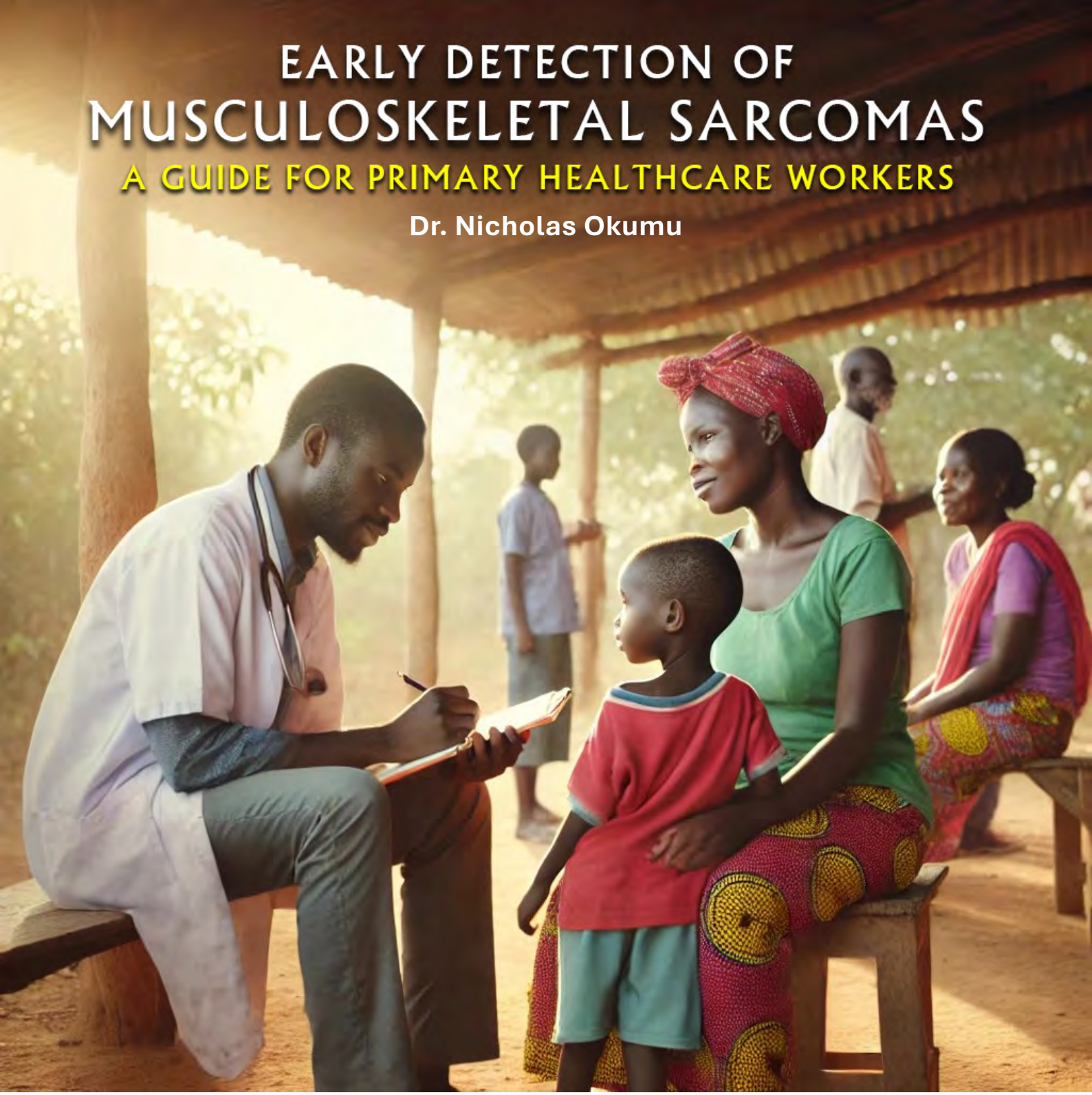
EARLY DETECTION OF MUSCULOSKELETAL SARCOMAS

A GUIDE FOR PRIMARY HEALTHCARE WORKERS

Dr. Nicholas Okumu



The Global Surgery Advocacy Fellowship
Enhancing Early Detection and Treatment of Musculoskeletal Sarcomas in Kenya

This manual is part of the Global Surgery Advocacy Fellowship 2024 Capstone Project titled Enhancing Early Detection and Treatment of Musculoskeletal Sarcomas in Kenya, sponsored by Operation Smile, The University of Global Health Equity (UGHE), and the Nkafu Policy Institute.

Note: Portions of this manual were developed with the assistance of AI-based tools under the guidance and final authorship of Dr. Nicholas Okumu. The author maintains copyright over the original creative and editorial contributions provided throughout the document.

For permission requests, contact Dr. Nicholas Okumu at nicholas.okumu@live.com.

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Acknowledgements

I would like to express my sincere gratitude to all those who contributed to the completion of this manual as part of the Global Surgery Advocacy Fellowship 2024 Capstone Project, *Enhancing Early Detection and Treatment of Musculoskeletal Sarcomas in Kenya*.

I am deeply thankful to **Desmond Jumbam**, Director of the Global Surgery Advocacy Fellowship, for his leadership and dedication to this program. Special thanks to **Dr. Ruben Ayala**, Chief Policy and Advocacy officer at Operation Smile for his unwavering support and commitment to global health, which has been a guiding force throughout this journey.

I also extend my heartfelt appreciation to **Steffanie Musho**, my mentor, whose guidance and insights were invaluable in shaping this project. I would also like to acknowledge the contributions of all the other mentors who provided their expertise and support.

I am grateful to **Operation Smile**, **The University of Global Health Equity (UGHE)**, and **The Nkafu Policy Institute** for organizing this valuable fellowship and providing the platform that has made this project possible.

To my **co-fellows for 2024**, your camaraderie and shared dedication have enriched this experience and further fueled our collective mission.

Most importantly, I want to acknowledge the **patients we treat**, who are the true inspiration behind this project. Their courage, resilience, and strength remind us of the importance of our work and the difference we can make by improving access to care. This manual is dedicated to ensuring that patients like them receive the timely and specialized care they deserve.

Thank you to everyone for your unwavering support and commitment to advancing global surgery and improving patient outcomes.

Contents

Executive Summary

Musculoskeletal sarcomas are rare but aggressive cancers arising from bones, muscles, fat, or connective tissues. Early detection is critical in improving survival rates and quality of life, particularly in resource-limited settings where many cases are missed at the primary healthcare level due to a lack of awareness. This training manual provides primary healthcare workers with the essential knowledge and tools to recognize symptoms and signs of musculoskeletal sarcomas, facilitating timely referral to specialized centers for proper diagnosis and treatment.

Key Features of the Manual:

1. **Understanding Musculoskeletal Sarcomas**: Definitions, types, and importance of early detection.
2. **Recognizing Symptoms and Signs**: Common symptoms such as persistent pain, swelling, and unexplained fractures that signal red flags.
3. **Differentiating Sarcomas from Other Conditions**: Understanding how to distinguish sarcomas from other diseases like benign bone tumors or infections.
4. **Diagnostic Tools at the Primary Care Level**: Initial assessment, including history taking, physical examination, and guidelines for basic diagnostic imaging.
5. **The Referral Process**: Importance of early referral and clear communication between primary healthcare workers, patients, and specialized centers.
6. **Case Studies and Practical Scenarios**: Real-life examples to emphasize the importance of timely recognition and referral of sarcoma cases.
7. **Resources and Continued Learning**: Access to further reading and contact details for national oncology networks for continuous support.
8. **Monitoring and Evaluation of Training Impact**: Tracking patient outcomes and gathering feedback to ensure continuous improvement in sarcoma detection and care.

Equipped with this manual, primary healthcare workers will be better positioned to detect musculoskeletal sarcomas early and ensure patients receive the necessary specialized care, ultimately improving survival rates and outcomes.

Foreword by Dr. Denis Foretia, Executive Chairman of Nkafu Policy Institute

At the **Nkafu Policy Institute**, we believe that effective public policies and strong healthcare systems are essential for the prosperity of any nation. Musculoskeletal sarcomas, while relatively rare, represent a significant burden in low-resource settings, where early detection and timely referral remain major challenges. These gaps in care are not only a health issue but also a policy challenge that must be addressed.

This training manual, developed by **Dr. Nicholas Okumu** as part of the Global Surgery Advocacy Fellowship—supported by **Operation Smile**, **The University of Global Health Equity (UGHE)**, and the **Nkafu Policy Institute**—is a pivotal resource in addressing these challenges. By equipping primary healthcare workers with the necessary skills and knowledge to recognize and refer suspected cases of musculoskeletal sarcomas early, we can ensure that more patients receive the specialized care they need promptly.

Dr. Okumu's commitment to improving outcomes for sarcoma patients reflects the type of forward-thinking, evidence-based leadership we need in healthcare. His work stands as a model of how we can bridge the gap between policy, healthcare delivery, and patient outcomes. I am confident that this manual will lead to lasting improvements in the care of musculoskeletal sarcomas, contributing to a healthier and more equitable future.

It is my hope that this manual will serve as a valuable tool for healthcare professionals, enabling them to make informed, life-saving decisions and contribute to the broader goal of enhancing healthcare access and quality across the continent.

Sincerely,
Dr. Denis Foretia
Executive Chairman, Nkafu Policy Institute

Foreword by Megan E. Anderson, MD, Chief Section of Orthopaedic Oncology, Beth Israel Deaconess Medical Center

This booklet by Dr. Okumu on the topic of sarcoma information and outreach is clear, concise and well-depicted with photos and illustrations. It will be the foundation to change lives and get patients with sarcoma the care they need. It is a top example for such education we should pioneer in the United States as well.

Sincerely,
Megan E. Anderson, MD

Chief, Section of Orthopaedic Oncology

Beth Israel Deaconess Medical Center

Foreword by Matthew R. DiCaprio, MD, Founder and President, Sarcoma Strong Inc.

At Sarcoma Strong Inc. our essential intent is to lessen the human suffering from sarcoma. We stand with sarcoma warriors at every step of their journey. We aspire to offer a healing touch. We do this by making human connections and collaborating with sarcoma warriors, colleagues, and institutions around the globe. Building this community of relationships for people to share their human spirit and what drives them, creates belief!

When Dr. Megan E. Anderson informed me of Dr. Nicholas Okumu's program for *Enhancing Early Detection and Treatment of Musculoskeletal Sarcomas in Kenya,* an alignment with Sarcoma Strong's mission of raising sarcoma awareness and patient advocacy was apparent. We proudly support the publication and dissemination of this educational manual, which will ideally lead to better awareness of sarcoma, earlier diagnosis, prompt referral to a specialist, and improved care for all Kenyan's afflicted with this rare cancer. Sarcoma Strong Inc. believes in Dr. Nicholas Okumu and his ongoing distribution of this booklet and educational efforts. With this novel approach his team will lessen the human suffering from sarcoma starting first in Kenya, then throughout Africa, and then worldwide.

Sincerely,

Matthew R. DiCaprio, MD

Founder and President, Sarcoma Strong Inc.

2022-2032 Board of Director, American Board of Orthopaedic Surgery

2026-2027 President, Musculoskeletal Tumor Society

Professor of Orthopaedic Surgery and Pathology

Director of Orthopaedic Oncology

Albany Medical Health System

Albany, New York, USA

Introduction:

You're sitting in your clinic when a young boy limps through the door, complaining of persistent leg pain. His mother mentions it started a few weeks ago, after he fell while playing. She thought it was just a sprain, but now the pain keeps him up at night. You might think it's something minor — maybe a strain or an infection. But what if it's something far more serious? What if that pain is the first sign of musculoskeletal sarcoma?

In Kenya, primary healthcare workers like you are often the first to see signs of musculoskeletal sarcoma. Right now, **you are the first line of defense for this child**. Your ability to recognize these early signs could make all the difference. If this is a sarcoma, your timely action could be the reason he walks into adulthood healthy and strong, rather than facing amputation or worse.

Musculoskeletal sarcomas are rare, aggressive cancers that arise from bones, muscles, and connective tissues. These cancers don't always scream for attention at first. Often, they present as subtle, everyday complaints—persistent pain, a slowly growing lump, or difficulty moving a limb. It's easy to mistake them for more benign conditions, but **this is where your experience and expertise come in**.

Here's the truth: **Early detection of sarcomas saves lives.** When caught early, survival rates for conditions like **osteosarcoma** can be as high as 70%-80%. But when diagnosis is delayed, those odds drop dramatically, sometimes as low as 15%. **Your training, intuition, and commitment to patient care could be the reason that a child walks into adulthood or that a parent sees their child grow up**.

You are in a powerful position. Many sarcoma patients first seek care in primary healthcare settings just like yours. Studies show that **80% of sarcoma cases in low- and middle-income countries (LMICs)** present first to primary healthcare providers. The earlier you can recognize the signs, the faster you can get the patient to the care they need. Your role isn't just about managing everyday complaints — it's about knowing when something more serious is hiding behind common symptoms and acting decisively.

And that's where this manual comes in. It's designed for you—to equip you with the knowledge and tools you need to recognize musculoskeletal sarcomas early. It's about ensuring that every patient who comes through your door gets the best chance at life, mobility, and a future. By understanding the key signs and when to refer, you can make an enormous difference.

This is not just another part of your job — it's an opportunity to be a hero for your patients. You might be the reason a child walks again, the reason a young adult starts their career without physical limitations, or the reason a parent lives to see their family grow.

The patients you see today are counting on you. So, let's ensure you're fully prepared to give them the care they need, right when they need it most.

Next Steps:

- In the subsequent sections, we'll dive deeper into recognizing specific symptoms, differentiating sarcomas from other conditions, and navigating the referral process. These components will further equip you, the primary healthcare worker with the tools they need to make early and informed decisions in diagnosing and referring sarcoma cases.

Section 1: Understanding Musculoskeletal Sarcomas

What Are Musculoskeletal Sarcomas?

Musculoskeletal sarcomas are cancers that grow in bones, muscles, or connective tissues. These cancers are rare but aggressive, often affecting children, adolescents, and young adults. Their rarity means they can easily be overlooked or mistaken for more common conditions like infections or benign growths, making early recognition and referral to specialized care crucial.

Two Main Types of Musculoskeletal Sarcomas:

1. **Bone Sarcomas:**
    - Cancers that develop in the bones.
    - **Examples:** Osteosarcoma, Ewing Sarcoma, and Chondrosarcoma.
    - **Relevant Statistics (Africa/Kenya):**
        - In sub-Saharan Africa, osteosarcoma accounts for approximately **5% of all childhood cancers**.
        - In Kenya, childhood cancers represent about **10%** of the total cancer burden, with osteosarcoma being among the most common malignancies affecting children and adolescents.
2. **Soft Tissue Sarcomas:**
    - Cancers that develop in muscles, fat, blood vessels, nerves, and other connective tissues.
    - **Examples:** Rhabdomyosarcoma (common in children), Liposarcoma, and Leiomyosarcoma.
    - **Relevant Statistics (Africa/Kenya):**
        - Soft tissue sarcomas account for approximately **1% of all cancers** globally, but in Africa, **delayed diagnosis leads to more advanced stages at presentation**.
        - Rhabdomyosarcoma, one of the most common soft tissue sarcomas in children, is often diagnosed late, reducing the survival rates in Kenya and similar regions.

Who Is at Risk?

While musculoskeletal sarcomas can affect people of all ages, certain age groups are more vulnerable:

- **Children and Adolescents (Aged 5-18):**
    - Sarcomas such as osteosarcoma and Ewing sarcoma are more common in children and teens. These cancers often develop during growth spurts and typically affect the long bones (such as the femur or tibia).
    - **Kenyan Context:** Childhood sarcomas, including osteosarcoma and rhabdomyosarcoma, disproportionately affect young populations, and many children in rural areas experience significant delays in diagnosis and treatment.
- **Young Adults (Aged 18-30):**
    - Although rarer in older adults, young adults are still at risk for bone and soft tissue sarcomas. Sarcomas can appear in various parts of the body, including the limbs, abdomen, and chest.
- **Adults Over 30:**
    - Soft tissue sarcomas, such as liposarcoma, are more common in older adults and can appear in any part of the body, particularly in the limbs and trunk.

Why Early Detection Is Critical

The earlier a sarcoma is detected, the better the chance of successful treatment. Early diagnosis not only increases survival rates but also improves the likelihood of limb-sparing surgery, which can preserve the patient's mobility and quality of life.

Here's why early detection is key:

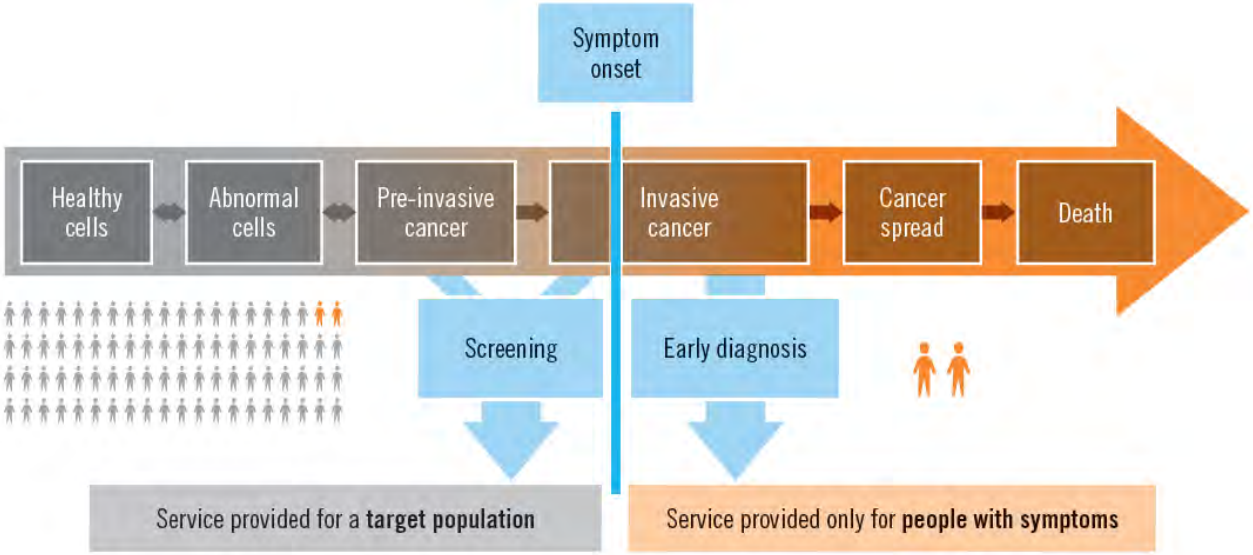
- **Increased Survival Rates:**
    - In high-income countries, early detection of localized osteosarcoma gives survival rates as high as **70%-80%**. In Kenya, however, due to delayed diagnosis, survival rates are significantly lower, sometimes as low as **15%**.
- **Improved Treatment Options:**
    - In sub-Saharan Africa, fewer than **10%** of children with osteosarcoma receive limb-sparing surgery. With earlier detection, this number could increase dramatically, improving quality of life.

- **Reducing the Risk of Metastasis:**
    - Sarcomas are aggressive, and delayed detection often means they spread (metastasize) to the lungs or other bones. Early detection can prevent this, significantly improving the patient's prognosis. Studies suggest that **60%-80%** of sarcoma cases in Africa present with metastasis, compared to **20%-30%** in high-resource settings.

The Role of the Primary Healthcare Worker

As a primary healthcare worker, you are in a unique position to make a critical difference. Sarcomas often present with subtle symptoms that can be mistaken for more common conditions like infections or trauma. However, your ability to identify key warning signs—persistent pain, unusual swelling, or a growing mass—can lead to an earlier diagnosis and better outcomes for your patients.

Figure 1: Distinguishing screening from early diagnosis according to symptom onset



Adapted from WHO's Guide to Cancer Prevention and Early Detection

Key Takeaways:

1. **Musculoskeletal sarcomas are rare but aggressive cancers that disproportionately affect children and young adults in Africa**.
2. **Delayed diagnosis significantly lowers survival rates, highlighting the critical role of primary healthcare workers in early detection**.
3. **Early detection can increase survival rates to as high as 80%, while delays can reduce survival to 30% or less**.
4. **Primary healthcare workers play a critical role in recognizing the early signs of sarcomas and ensuring timely referrals to specialists.**

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Section 2: Recognizing the Signs and Symptoms of Musculoskeletal Sarcomas

As a primary healthcare worker, you have the unique opportunity to recognize musculoskeletal sarcomas early, often before the disease progresses to an advanced stage. Sarcomas are rare but aggressive cancers, and their early symptoms can be subtle. This section is designed to help you identify red flags and initiate timely referrals to specialists.

Common Symptoms to Watch For

1. **Persistent Bone or Joint Pain:**
    - **What to Look For:** A child or young adult presenting with persistent pain in the bones or joints. The pain may initially be mild but becomes more severe over time, often worsening at night. The patient may have difficulty bearing weight or moving the affected limb.
    - **Why It's Important:** Persistent, unexplained bone pain is a common early symptom of bone sarcomas like osteosarcoma, which most commonly affects adolescents and young adults during periods of rapid growth. Studies show that approximately **40% of children** with osteosarcoma present with localized pain as the first symptom.
    - **Red Flag: Pain lasting more than 2-3 weeks**, particularly in children and adolescents, that is not responding to standard pain relief measures, warrants further investigation.
2. **Swelling or a Lump:**
    - **What to Look For:** A noticeable swelling, lump, or mass in the soft tissue or bones, often in the arms, legs, or pelvis. The mass may or may not be painful.
    - **Why It's Important:** Soft tissue sarcomas often present as a painless, slow-growing lump. Rhabdomyosarcoma, the most common soft tissue sarcoma in children, often goes unnoticed for weeks due to the lack of pain, delaying diagnosis. In Kenya, delayed diagnosis is a significant issue, with studies showing that **50-60% of sarcoma patients** present with advanced disease.
    - **Red Flag: A growing, painless lump** that persists for more than a month should raise concern, especially if the lump is firm to the touch or increasing in size.

3. **Unexplained Fractures:**
    - **What to Look For:** A fracture that occurs with minimal or no trauma. The patient may have a history of pain in the area before the fracture, indicating that the bone was already weakened by a tumor.
    - **Why It's Important:** Pathological fractures, or fractures occurring in bones weakened by a tumor, are a hallmark of advanced bone sarcoma. These are seen in approximately **10-15%** of osteosarcoma patients.
    - **Red Flag: Fracture after minimal trauma**, especially in younger patients or in bones that had been painful or swollen prior to the break.
4. **Limited Range of Motion or Stiffness:**
    - **What to Look For:** The patient may have difficulty moving a limb, particularly if the tumor is located near a joint. Stiffness, reduced range of motion, or weakness in the affected area can be early signs.
    - **Why It's Important:** Sarcomas near joints can restrict movement and cause stiffness, especially if the tumor invades surrounding tissues. Early sarcomas may present with restricted mobility in about **20-30% of cases**, according to reports from African oncology centers.
    - **Red Flag: A loss of mobility** or persistent stiffness that is not related to an obvious injury or trauma.

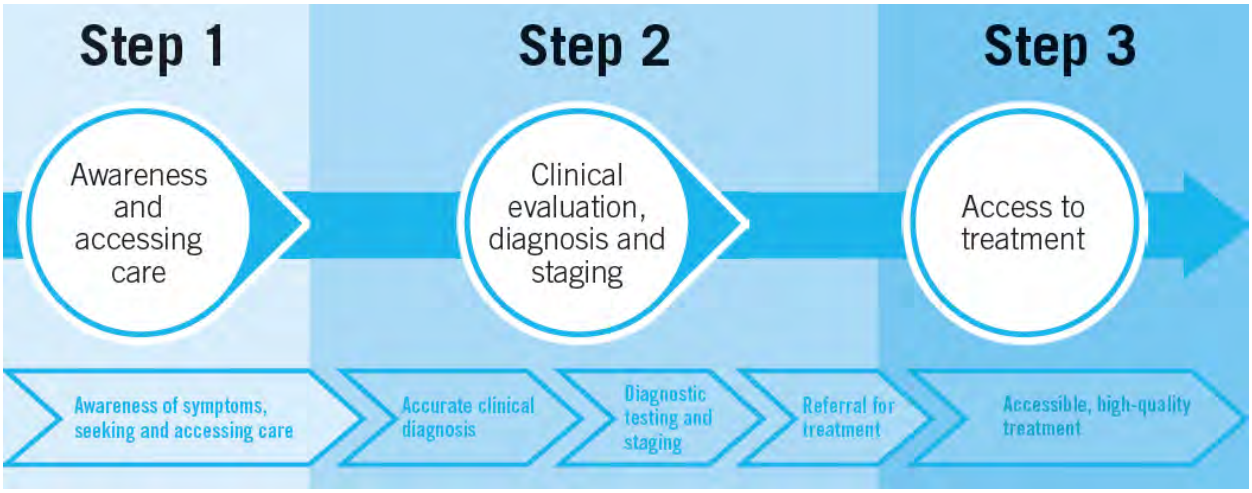
Late Symptoms of Advanced Sarcoma

As sarcomas progress, more systemic symptoms may develop. These are often signs of metastasis or a tumor that has grown large enough to affect other bodily functions:

1. **Weight Loss and Fatigue:**
    - **What to Look For:** The patient may present with unexplained weight loss or persistent fatigue that does not improve with rest.
    - **Why It's Important:** These are often late-stage symptoms, indicating that the cancer has metastasized or become more aggressive. Studies from sub-Saharan Africa suggest that **60-80% of sarcoma patients** present with metastatic disease at diagnosis.

2. **Fever:**
    - **What to Look For:** A low-grade fever that persists without any clear cause, often accompanied by other signs of illness.
    - **Why It's Important:** Fever can be a sign of the body reacting to the tumor's growth or a secondary infection. While fever is less common in early-stage sarcoma, it may appear in advanced cases, particularly when the tumor becomes necrotic.

Figure 2: Essential elements of cancer early diagnosis



Adapted from WHO's Guide to Cancer Prevention and Early Detection

Key Takeaway:

Late symptoms such as weight loss, fatigue, and fever generally indicate advanced or metastatic sarcoma. The focus of early detection is on recognizing localized symptoms (**pain, swelling, lumps, and fractures**) and acting quickly to initiate referral and diagnostic workups.

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Section 3: Diagnostic Procedures for Musculoskeletal Sarcomas at the Primary Care Level

As a primary healthcare worker, your role is to identify early warning signs of musculoskeletal sarcomas and initiate timely referrals. The diagnostic tools available to you should be basic but effective in raising suspicion of malignancy. Your goal is to gather enough information to refer the patient to a specialist for more advanced diagnostic workup. In this section, we will focus on the steps you can take at the primary care level, emphasizing early identification and appropriate referral.

1. Patient History and Physical Examination

The first step in diagnosing musculoskeletal sarcomas is a thorough patient history and physical examination. Pay close attention to the following:

- **History of Present Illness:** Ask detailed questions about the pain, swelling, or lump. When did the symptoms begin? Has the patient experienced any recent trauma? Does the pain worsen at night? Is the swelling growing?
- **Systemic Symptoms:** Inquire about weight loss, fatigue, fever, or any other systemic symptoms. Although these are late-stage signs, their presence could influence the urgency of referral.
- **Physical Examination:** Examine the affected area for tenderness, swelling, or deformity. Assess for reduced range of motion, skin changes, or any signs of a growing mass. Palpate the mass to check for consistency and size. Pay attention to any neurological deficits, which may indicate nerve involvement.

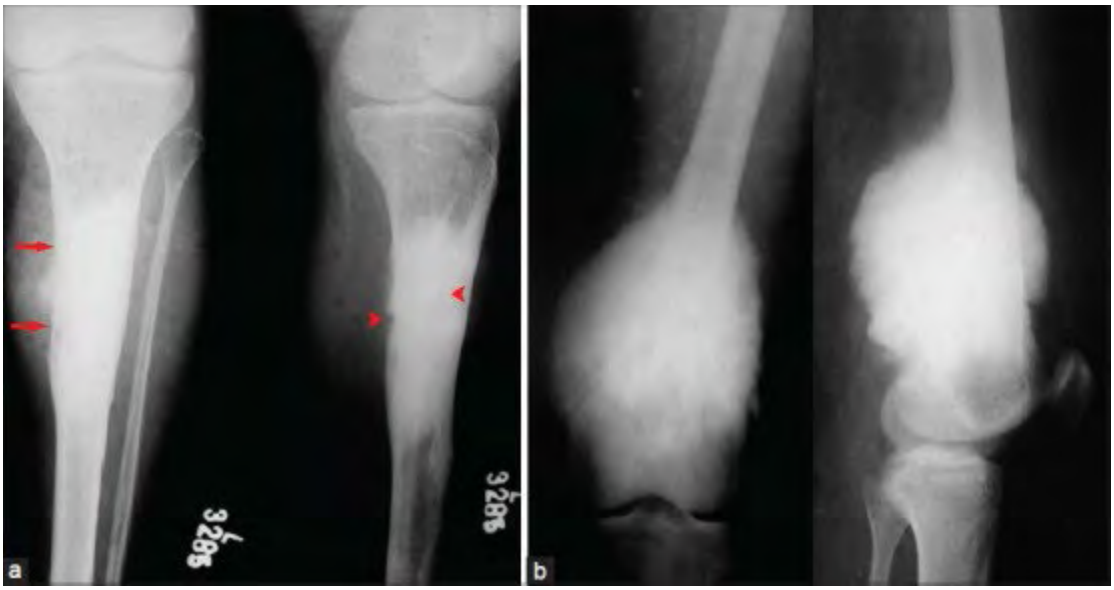
2. Basic Imaging Studies

If you suspect musculoskeletal sarcoma, imaging can help provide more information about the affected area. However, advanced imaging modalities like MRI and CT scans should be reserved for specialized centers. At the primary care level, **X-ray** and **ultrasound** are the primary diagnostic tools available to you.

a) X-ray

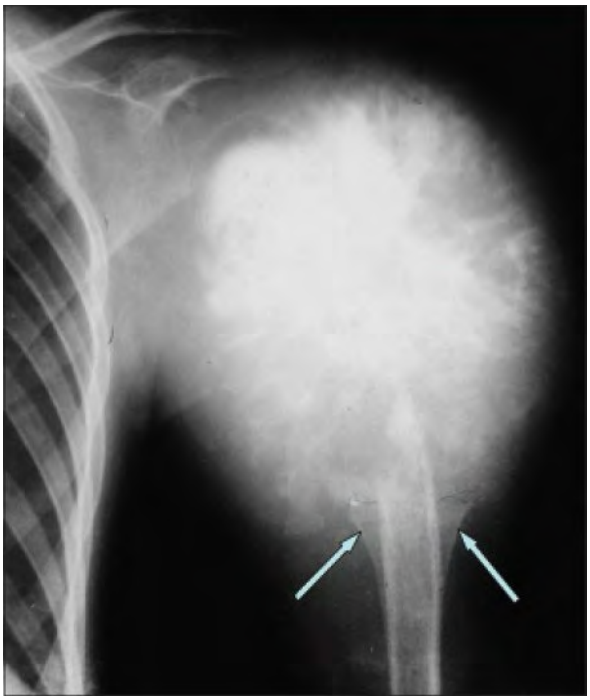
- **When to Use:** X-rays are the first-line imaging study for suspected bone sarcomas. If the patient presents with persistent bone pain, swelling, or an unexplained fracture, an X-ray can provide critical initial information.
- **What It Shows:** X-rays can show bone damage, unusual growth, or changes that may suggest sarcoma. Common findings in sarcomas, such as the "sunburst" pattern in osteosarcoma, may be evident on X-rays.
- **Next Steps:** If the X-ray is suspicious for a sarcoma, an urgent referral to a specialist is required for further evaluation and confirmation via advanced imaging and biopsy.

Figure 3: X-ray of Osteosarcoma



X-ray anteroposterior and lateral views of proximal tibia and knee joint showing diaphyseal osteosarcoma of tibia with sclerosis (arrow), cortical destruction on posteromedial side (arrow heads) and new bone formation in the soft tissues (b) x-ray distal end of femur (anteroposterior and lateral views) showing sclerosis/radio-opacity in sclerosing osteosarcoma

Figure 4: X-ray of Osteosarcoma



X-ray of humerus anteroposterior view showing osteosarcoma of the proximal humerus- typical sun burst or sun ray appearance, new bone formation in soft tissues, and Codman's triangles (arrows)

Figure 5: X-ray of Osteosarcoma

Telangiectatic type of osteosarcoma of the proximal tibia: (a) X-ray anteroposterior and lateral views showing lysis and expansion (b) MRI showing fluid levels

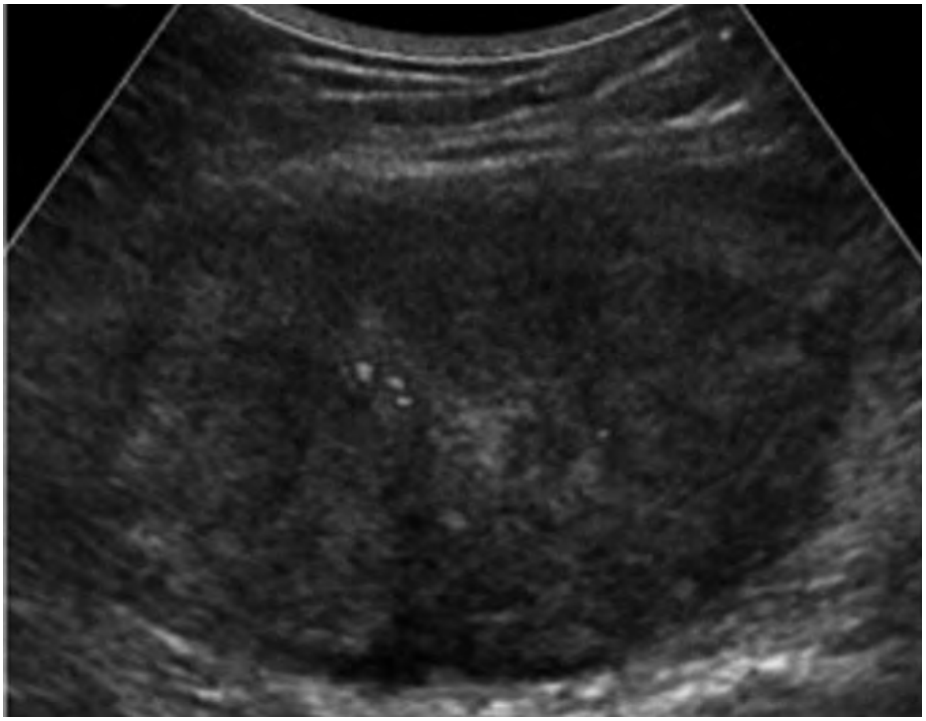
Figure 6: X-ray of Osteosarcoma

X-ray of knee joint anteroposterior views showing surface osteosarcoma: (a) parosteal (b) periosteal. See the under lying cortex is visibly intact in 'a' and lifting of periosteum in 'b' (red arrow). However, both are on the surface of the bone

b) Ultrasound

- **When to Use:** Ultrasound is useful for evaluating soft tissue masses. If a patient presents with a painless or growing lump in the soft tissues (such as the arm, leg, or back), an ultrasound can help determine whether the mass is solid or cystic.
- **What It Shows:** Ultrasound can differentiate between benign and malignant characteristics of soft tissue masses. It can also provide useful information about the size, location, and structure of the mass.
- **Next Steps:** If the ultrasound raises suspicion of a malignant soft tissue tumor, immediate referral to a specialist for further investigation is necessary.

Figure 7: Ultrasound Liposarcoma



63-year-old man with liposarcoma of thigh. Power Doppler sonographic image of thigh shows heterogeneous solid mass with internal flow, which suggests malignancy. Excision revealed liposarcoma.

Note: Ultrasound is notoriously operator dependent. Sonographic evaluation should ideally be performed personally by a radiologist to yield the most information. Emphasis on proper technique and recognition of artifacts are essential for accurate characterization of masses.

3. Laboratory Tests at the Primary Care Level

While laboratory tests are not definitive for diagnosing sarcomas, they can help rule out other conditions or assess the patient's overall health.

- **Blood Work:**
    - CBC (Complete Blood Count) may reveal signs of anemia or infection, which can be present in patients with advanced cancer.
    - Blood tests such as ESR (Erythrocyte Sedimentation Rate) or CRP (C-Reactive Protein) may be elevated, indicating inflammation, but these are non-specific markers.
- **Urinalysis:**
    - Performed to rule out other causes of systemic symptoms, such as infections or kidney disease.

4. Importance of Timely Referral

Once you have conducted the initial history, physical examination, and imaging (X-ray or ultrasound), your role is to make a prompt and informed referral to a specialist. **Delaying referral to higher-level care can result in tumor progression and worsen outcomes**.

When to Refer:

- The X-ray or ultrasound reveals abnormalities suggestive of sarcoma.
- A patient presents with a persistent lump, swelling, or pain that does not improve after 2-3 weeks of conservative treatment.
- There is an unexplained fracture, especially with a history of pain or swelling prior to the fracture.
- The patient presents with systemic symptoms (such as weight loss or fever) alongside a suspicious mass or persistent pain.

Referral Pathway

- **Referral to a Specialized Cancer Center:** Refer the patient to a specialized cancer or orthopedic center with the capacity for advanced diagnostic testing (e.g., biopsy, MRI, CT scan) and treatment (e.g., surgery, chemotherapy).

- **Urgency of Referral:** Emphasize the need for **urgent** referral if the patient presents with rapidly progressing symptoms, such as a rapidly growing lump or unexplained fracture.

Figure 8: Steps in cancer early diagnosis: components and delays

Step of early diagnosis[a]	Component[a]	Potential delays[b]
Awareness and accessing care (patient interval)[c]	Population aware about symptoms (appraisal interval) Patients with symptoms seek and access health care (health-seeking interval)	Access delay[c]
Clinical evaluation, diagnosis and staging (diagnostic interval)	Accurate clinical diagnosis (doctor interval) Diagnostic testing and staging Referral for treatment	Diagnostic delay[d]
Access to treatment (treatment interval)	Treatment timely, accessible, affordable, acceptable and high quality	Treatment delay[e]

Adapted from WHO's Guide to Cancer Prevention and Early Detection

Key Takeaways:

1. **X-rays and ultrasounds** are the main diagnostic tools available to primary healthcare workers. Request these tests for any patient presenting with persistent pain, a growing mass, or an unexplained fracture.
2. **Laboratory tests** can be used to assess the patient's overall health, but they are not diagnostic for sarcomas.
3. **Timely referral** to a specialist is crucial. The earlier a patient is referred for advanced diagnostics (such as biopsy, MRI, or CT), the better the chances of a successful outcome.
4. **Your role is not to confirm the diagnosis, but to identify suspicious cases** and ensure they reach the appropriate care.

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Section 4: When and Where to Refer Patients with Suspected Musculoskeletal Sarcomas

As a primary healthcare worker, your most crucial role in managing musculoskeletal sarcomas is to ensure that patients are referred **early** and to the **right specialist**. Sarcomas progress quickly, and timely referral to a specialized cancer or orthopedic center can make a significant difference in the patient's outcome.

When to Refer:

You should refer a patient **immediately** if they present with any of the following signs:

1. **Persistent Bone Pain or Swelling:**
    - If the patient has persistent bone or joint pain lasting more than **2-3 weeks**, especially if the pain worsens at night or doesn't improve with rest or treatment.
    - If you observe **swelling** in the soft tissues or bones that has been growing for more than a month.
2. **Suspicious X-ray or Ultrasound Findings:**
    - X-rays that show **bone destruction** or other abnormal features like periosteal reactions (e.g., "sunburst" patterns) should prompt an immediate referral.
    - Ultrasound findings that suggest a solid mass or any signs of malignancy in the soft tissues.
3. **Unexplained Fracture:**
    - A fracture that occurs with minimal or no trauma, especially if the patient had pain or swelling in the area before the fracture, should lead to an urgent referral.
4. **Systemic Symptoms:**
    - If the patient has **unexplained weight loss, fatigue, or fever** along with a growing lump or persistent pain, these may indicate advanced disease and warrant a quick referral.

Where to Refer:

1. **Specialized Cancer Centers:**
    - Refer the patient to a **tertiary care center** or specialized cancer/orthopedic unit that is equipped to handle sarcoma cases. Examples in Kenya include:
        - **Kenyatta National Hospital** (Nairobi)

- **Moi Teaching and Referral Hospital** (Eldoret)
- **Other Regional Cancer Centers**

2. **Orthopedic Surgeons and Oncologists:**
    - Patients should be referred to orthopedic surgeons or oncologists with expertise in sarcoma care. Ensure the referral specifies the suspected diagnosis of sarcoma to expedite the process.

Why Referral to Specialized Centers is Crucial:

Musculoskeletal sarcomas are complex and treating them requires the involvement of multiple specialists. A **multidisciplinary team** (MDT) approach is essential for managing sarcomas effectively, and this can only be provided at specialized centers. Here's why:

- **Surgical Expertise:** Orthopedic surgeons with specialized training in sarcoma care can perform complex procedures like **limb-sparing surgery**, which aims to remove the tumor while preserving the affected limb.
- **Oncologists:** Medical oncologists will assess the need for chemotherapy or radiation therapy as part of the overall treatment plan, which can improve survival outcomes.
- **Radiologists and Pathologists:** Radiologists help in staging the cancer and determining the extent of spread, while pathologists provide a definitive diagnosis through biopsy analysis.
- **Rehabilitation Specialists:** After surgery, patients often need rehabilitation to regain function and adapt to any physical changes.

In countries with established referral systems, patients referred to multidisciplinary teams have a significantly higher chance of survival and recovery. For example, limb-sparing surgery is successful in over **85%** of cases in high-resource settings, compared to only **5-10%** in sub-Saharan Africa due to delayed referrals and lack of access to specialized care.

Challenges to Referral:

- **Distance and Access:** In rural areas, patients may need to travel long distances to reach specialized centers. Encouraging early referral helps mitigate these delays.
- **Financial Barriers:** Some patients may struggle to afford the cost of transportation and treatment. Where possible, assist the patient in accessing government or community resources for support.

Despite these challenges, your role in recognizing early symptoms and initiating referral is key to improving outcomes for patients with suspected musculoskeletal sarcomas.

Key Takeaways:

1. **When to Refer:** Persistent bone pain, suspicious X-ray or ultrasound findings, unexplained fractures, or systemic symptoms should prompt an immediate referral.
2. **Where to Refer:** Direct patients to specialized cancer or orthopedic centers, such as Kenyatta National Hospital or Moi Teaching and Referral Hospital, where multidisciplinary teams are available to manage complex sarcoma cases.
3. **Timely Referral Saves Lives:** Early referral can improve survival rates and increase the chance of limb-sparing surgery, which is only possible when patients are treated by multidisciplinary teams of specialists.

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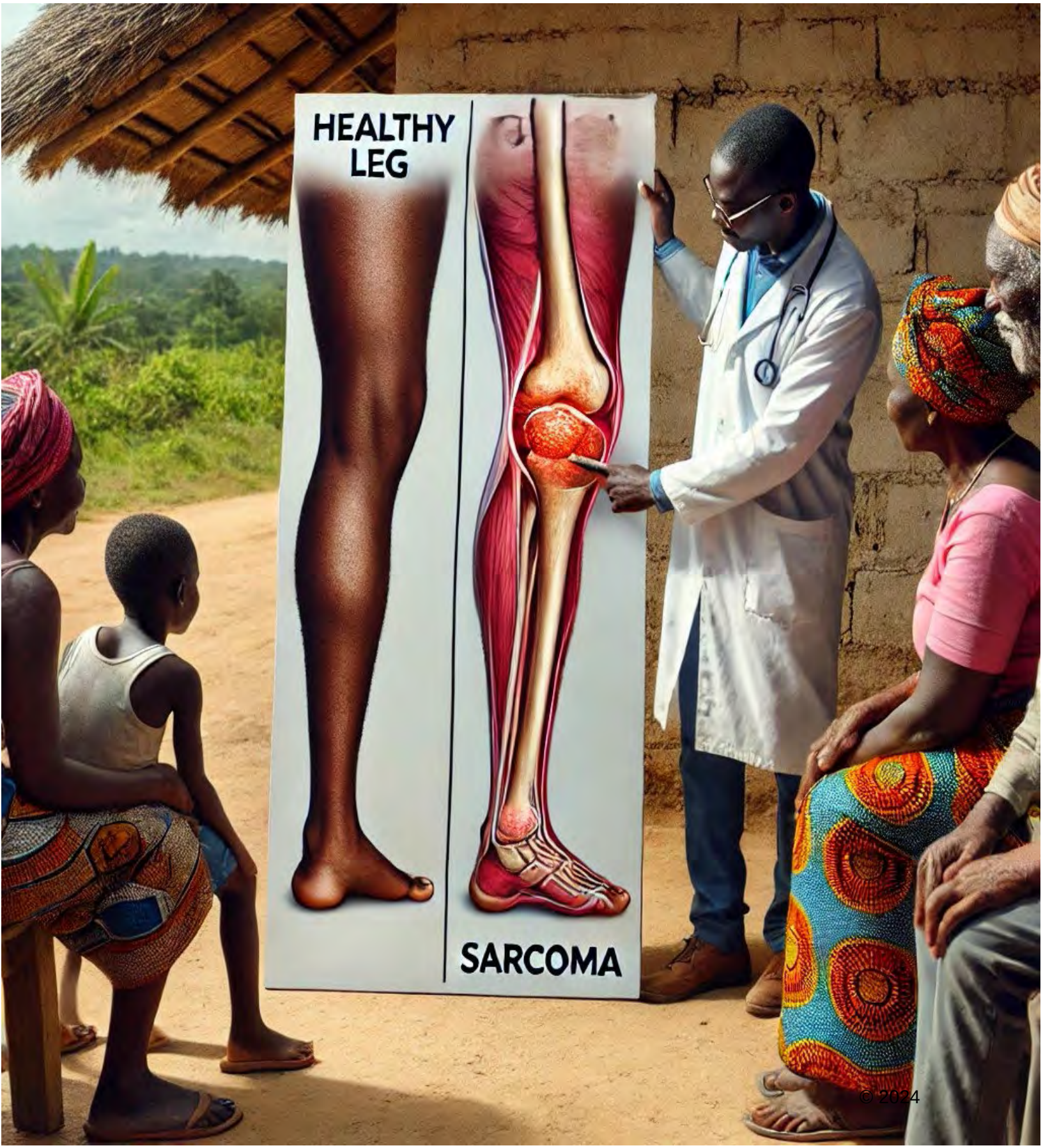
Section 5: Treatment Options and Outcomes for Musculoskeletal Sarcomas



Once a patient with a suspected musculoskeletal sarcoma is referred to a specialized center, they will undergo a series of evaluations to determine the most appropriate treatment plan. Treatment options for sarcomas typically include surgery, chemotherapy, and radiation, all of which are coordinated by a multidisciplinary team. The sooner treatment begins, the better the outcomes, particularly in terms of survival and limb preservation.

1. Surgery

Surgery is often the primary treatment for musculoskeletal sarcomas, especially when the tumor is localized. The goal of surgery is to remove the tumor entirely, with a margin of healthy tissue around it to ensure that no cancer cells are left behind.

a) Limb-Sparing Surgery

- **What It Is:** Limb-sparing surgery aims to remove the tumor without amputating the affected limb. Advances in surgical techniques and reconstructive procedures have made it possible to preserve the limb in many cases.
- **When It's Used:** Limb-sparing surgery is performed when the tumor can be safely removed without compromising the function of the limb. It is most successful in cases where the sarcoma is detected early and has not spread extensively.
- **Outcome:** In high-resource settings, limb-sparing surgery is successful in **85% of cases** when performed early, but in sub-Saharan Africa, the rate drops significantly due to late diagnosis and referral. When successful, this procedure allows patients to retain limb function and avoid amputation, leading to a better quality of life.

Figure 9: Limb Salvage Surgery

These images show a distal femur tumor and options that can be used for limb sparing surgery

b) Amputation

- **What It Is:** Amputation is sometimes necessary when the tumor is too large, too close to critical structures, or has spread beyond the capacity for limb preservation.
- **When It's Used:** Amputation may be the only option if the tumor has invaded nerves, blood vessels, or other vital structures, or if the sarcoma is diagnosed at an advanced stage.
- **Outcome:** While amputation can be lifesaving, it significantly impacts a patient's mobility and quality of life. Early referral and diagnosis reduce the need for amputation by increasing the chances of successful limb-sparing surgery.

Figure 10: Amputee with prosthetic

This image shows an amputee being assisted by a healthcare professional

2. Chemotherapy

Figure 11: Patients in the chemotherapy process

These images show patients in the process of receiving chemotherapy

Chemotherapy is often used in combination with surgery to treat musculoskeletal sarcomas. It is particularly effective for certain types of sarcomas, such as osteosarcoma and Ewing sarcoma, which are more common in children and adolescents.

- **What It Is:** Chemotherapy uses drugs to kill cancer cells or stop their growth. It can be given before surgery (neoadjuvant therapy) to shrink the tumor, making it easier to remove, or after surgery (adjuvant therapy) to kill any remaining cancer cells.
- **Outcome:** Chemotherapy has been shown to improve survival rates in patients with sarcomas. In high-income countries, the combination of surgery and chemotherapy can lead to a **5-year survival rate of over 70%** for localized osteosarcoma.

Figure 12: X-ray of Osteosarcoma

X-ray anteroposterior and lateral views showing that after chemotherapy the tumor becomes well defined with better capsulation: (a) before chemotherapy and (b) after chemotherapy

3. Radiation Therapy

Figure 13: Radiotherapy Machine

This image shows a radiotherapy machine

Radiation therapy may also be used in the treatment of musculoskeletal sarcomas, particularly for soft tissue sarcomas or when surgical removal of the tumor is not possible.

- **What It Is:** Radiation therapy uses high-energy X-rays to kill cancer cells or shrink tumors. It can be used before surgery to reduce the size of the tumor or after surgery to target any remaining cancer cells.
- **Outcome:** Radiation is especially useful for patients who are not good candidates for surgery or for those with soft tissue sarcomas. It can also be combined with surgery and chemotherapy to improve outcomes.

4. Multidisciplinary Care

As highlighted in previous sections, sarcoma treatment requires a **multidisciplinary team** of specialists, including orthopedic surgeons, oncologists, radiologists, and pathologists. These professionals work together to develop an individualized treatment plan based on the patient's specific type of sarcoma, the stage of the disease, and the patient's overall health.

- **Role of the MDT:** The team coordinates the use of surgery, chemotherapy, and radiation therapy to ensure the best possible outcome for the patient. Rehabilitation specialists are also involved to help patients regain function and quality of life after treatment.

5. Treatment Outcomes

The outcome of treatment depends heavily on the stage at which the sarcoma is diagnosed and the quality of care the patient receives. Early diagnosis and treatment improve survival rates and reduce the likelihood of needing amputation. In contrast, delayed diagnosis often results in poorer outcomes.

Early Referral Outcomes:

- **Survival Rates:** Patients with early-stage sarcomas who receive timely treatment can expect a **5-year survival rate of over 70%** for osteosarcoma and other bone sarcomas.
- **Limb-Sparing Surgery:** Over **85%** of patients in high-income settings who are referred to early can undergo limb-sparing surgery, preserving their limb and quality of life.

Delayed Referral Outcomes:

- **Survival Rates:** In cases where referral is delayed, survival rates drop significantly. In low-resource settings, the survival rate can fall to **15%** due to late diagnosis and limited access to specialized care.

- **Amputation Rates:** Late-stage diagnosis often results in amputation, which could have been avoided with earlier intervention. In sub-Saharan Africa, amputation rates remain high due to delayed referrals and the lack of specialized care centers.

6. Barriers to Successful Treatment

Despite the effectiveness of the available treatment options, several barriers can prevent patients from receiving the care they need, including:

- **Geographic Barriers:** Patients in rural areas may have difficulty accessing specialized care centers, leading to delays in diagnosis and treatment.
- **Financial Barriers:** The cost of treatment, including surgery, chemotherapy, and radiation therapy, can be prohibitive for many patients, particularly in low-resource settings.
- **Limited Resources:** Many healthcare facilities in low- and middle-income countries lack the equipment, medications, and specialists needed to provide comprehensive sarcoma care.

Addressing these barriers through improved referral systems, increased healthcare funding, and international partnerships is crucial for improving sarcoma outcomes in Africa.

Key Takeaways:

1. **Surgery, chemotherapy, and radiation** are the main treatment options for musculoskeletal sarcomas, with surgery being the primary mode of treatment.
2. **Limb-sparing surgery** is possible in many cases, especially when the tumor is detected early, while amputation may be necessary in advanced cases.
3. **Multidisciplinary care** is essential for providing the best outcomes, as sarcoma treatment involves the expertise of surgeons, oncologists, radiologists, and rehabilitation specialists.
4. **Early diagnosis and referral** significantly improve survival rates and the chances of limb preservation, while delayed diagnosis results in poorer outcomes and higher amputation rates.

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Section 6: The Referral Process

1. Establishing Referral Pathways

As a primary healthcare worker, recognizing when a patient may have musculoskeletal sarcoma and initiating a referral as early as possible is key to improving outcomes. Time is crucial, and delaying referral reduces the chances of successful treatment.

- **Importance of Early Referral to Specialized Centers:**
    - Early referral greatly improves outcomes. Patients diagnosed early are more likely to receive limb-sparing surgery and have better survival rates. Delays in referral can lead to the spread of cancer, requiring more aggressive treatments like amputation or chemotherapy.
    - Referral to a **multidisciplinary team (MDT)** is essential for accurate diagnosis and comprehensive treatment. These teams typically include orthopedic surgeons, oncologists, radiologists, and pathologists, all of whom work together to create a treatment plan.
- **Identifying Nearby Cancer Treatment or Orthopedic Oncology Centers:**
    - Establish a referral pathway to **specialized cancer treatment centers**. Examples in Kenya include:
        - **Kenyatta National Hospital** (Nairobi)
        - **Moi Teaching and Referral Hospital** (Eldoret)
        - **Other Regional Referral Centers** with cancer treatment facilities.
    - Maintain up-to-date contact information for specialists and centers to facilitate the referral process.

2. Communicating with the Referral Facility

- **Making Direct Contact with a Specific Individual:**
    - **Before the patient leaves your facility**, ensure that you have contacted the referral center. It is important to reach out to a specific individual—preferably a doctor or nurse at the receiving center—who can expect the patient's arrival.
    - Provide the **patient's history**, your clinical findings, and the results of any tests already performed (e.g., X-rays or ultrasounds). This allows the receiving team to prepare for the patient's arrival and avoid duplication of tests.

- **Sending a Written Referral Note:**
    - A clear **written referral note** should accompany the patient, summarizing the history, clinical findings, tests conducted, and the reason for referral. Include your contact information in case the receiving team needs to clarify details or discuss the case further.
- **Reference for the Patient:**
    - Give the patient and their family a **clear referral note** and explain that they should ask for the specific individual you've contacted at the referral center. This gives the patient a **point of reference** and ensures they do not get lost in the system. Explain to them why it's important to follow up with this specific person upon arrival.

3. Preparing the Patient for Referral

- **Clear Communication with the Patient and Family:**
    - Clearly explain the reasons for referral, including the possibility of cancer and the need for specialized care. Use simple, non-technical language to make sure the patient and family understand the seriousness of the situation.
- **Explaining the Urgency and Importance of Early Diagnosis and Treatment:**
    - Emphasize that the referral is urgent but also reassure them that early diagnosis increases the chances of successful treatment. Make sure they understand the importance of following through with the referral as soon as possible.
- **Providing Supportive Care Until Referral is Completed:**
    - While awaiting referral, manage the patient's symptoms, such as pain, to make them as comfortable as possible.
    - Help the patient and family arrange transportation if needed and explain the logistics of getting to the referral center.

Key Takeaways:

1. **Direct Communication with the Referral Center:**
    - Contact a specific individual at the referral center to ensure the patient is expected and their medical history is known in advance. This prevents delays in care and provides the patient with a clear point of contact.
2. **Written Referral Note:**
    - Provide the patient with a detailed referral note that includes their medical history, test results, and the reason for referral, along with your contact information.
3. **Clear Communication with the Patient and Family:**
    - Clearly explain the importance of the referral and the urgency for treatment. Make sure the patient and family know whom to contact when they arrive at the referral center.
4. **Support During Referral:**
    - Provide pain management and logistical support to help the patient reach the referral center without delay.

Section 7: Case Studies and Practical Scenarios

Case studies are an essential tool for reinforcing what has been learned and applying it in real-life situations. Below are three scenarios that highlight the importance of early detection and referral for musculoskeletal sarcomas.

Case Study 1: Identifying Osteosarcoma in a Young Male

- **Scenario:** A 14-year-old boy presents with persistent knee pain after a minor fall. The pain continues for more than two weeks despite rest and over-the-counter pain relief medications. The pain is worse at night, and on examination, a hard, immobile mass is detected near the knee.
- **Discussion:**
    - **Key Red Flags:** Persistent pain that doesn't respond to treatment, especially worsening at night, and a growing, immobile mass should raise suspicion for osteosarcoma.
    - **Primary Care Actions:** Order an X-ray of the knee, which may reveal bone destruction or periosteal reactions (e.g., "sunburst" appearance or Codman's triangle). If findings are suspicious, initiate an **urgent referral** to a specialized orthopedic oncology center for further imaging (CT or MRI) and biopsy.
    - **Why Early Referral is Important:** Early diagnosis of osteosarcoma significantly increases the chances of limb-sparing surgery and improves survival outcomes.
- **Outcome if Delayed:** Delayed referral could lead to tumor spreading to the lungs (metastasis), which lowers the patient's survival chances and larger tumor size and local spread could necessitate amputation.

Case Study 2: Ewing Sarcoma in a Child

- **Scenario:** A 10-year-old girl presents with swelling and pain in her upper arm, along with a recent history of fever. Initially, the swelling was thought to be due to an infection, and antibiotics were prescribed. However, after a week, the swelling persists, and an X-ray reveals a lytic lesion in the bone.
- **Discussion:**
    - **Key Red Flags:** Persistent swelling despite antibiotic treatment, fever, and a lytic bone lesion on X-ray are strong indicators of Ewing sarcoma.
    - **Primary Care Actions:** Recognize that the persistence of symptoms after antibiotics indicates a more serious condition. Refer the patient immediately for biopsy and advanced imaging at a cancer treatment center, as these are required for definitive diagnosis.
    - **Why Early Referral is Important:** Ewing sarcoma often presents with systemic symptoms, and early referral is crucial to start chemotherapy and surgical intervention before the disease progresses.
- **Outcome if Delayed:** Delay in referral could lead to the cancer spreading to the lungs or other bones, significantly reducing the effectiveness of treatment and increasing mortality risk.

Case Study 3: Rhabdomyosarcoma (Soft Tissue Tumor) in a Young Child

- **Scenario:** A 5-year-old boy presents with a rapidly growing, painless mass in his thigh. The mass has been increasing in size over the past month. On physical examination, the mass is firm but not attached to the overlying skin. There is no history of trauma.
- **Discussion:**
    - **Key Red Flags:** Rapid growth of a painless mass, particularly in a young child, should raise suspicion of rhabdomyosarcoma, a common soft tissue sarcoma in children.
    - **Primary Care Actions:** Order an ultrasound to assess the mass. If the ultrasound findings suggest a solid tumor, an urgent referral for biopsy and further imaging at a specialized center is necessary.
    - **Why Early Referral is Important:** Early referral allows for the initiation of multimodal treatment, including surgery, chemotherapy, and possibly radiation therapy. Rhabdomyosarcoma has a good prognosis if caught early and treated aggressively.
- **Outcome if Delayed:** Delay in referral may result in the tumor invading nearby structures, making surgical removal more complex and reducing survival chances.

Additional Considerations for All Case Studies:

1. **Role of Imaging in Primary Care:**
    - Basic imaging such as X-rays (for bone lesions) and ultrasound (for soft tissue masses) should be used to gather initial information. These should be followed by immediate referral to specialists for advanced imaging (CT, MRI) and biopsy if cancer is suspected.
2. **Clear Communication with Families:**
    - In all these cases, the healthcare worker should clearly communicate the seriousness of the situation and the need for referral to a specialized center for further evaluation. Stress the importance of not delaying care, as early treatment can prevent complications and improve outcomes.
3. **Handling Psychological Concerns:**
    - Families may experience anxiety upon hearing that their child needs to be referred for possible cancer treatment. It is essential to offer support and emphasize that early diagnosis and treatment are crucial for the best outcomes.
4. **Multidisciplinary Team Involvement:**
    - Once referred, the patients will benefit from a multidisciplinary team approach involving surgeons, oncologists, pathologists, and rehabilitation specialists. Each of these professionals will play a role in diagnosing, planning treatment, and supporting recovery.

Key Takeaways:

- **Recognize Red Flags:** Persistent pain, swelling, masses, or unexplained symptoms (like fever) should prompt concern for sarcoma.
- **Imaging as a First Step:** X-rays and ultrasound are valuable tools for detecting abnormalities but should be followed by referral to a specialist for definitive diagnosis.
- **Urgent Referral:** Don't wait for symptoms to worsen—early referral to a multidisciplinary team can significantly improve the patient's chances of survival and limb preservation.
- **Communication is Key:** Clearly explain to the patient and their family the need for specialist care and the importance of not delaying treatment.

References:

1. Mirabello, L., Troisi, R. J., & Savage, S. A. (2009). Osteosarcoma incidence and survival rates from 1973 to 2004. Cancer, 115(7), 1531-1543. doi:10.1002/cncr.24121. Available at: https://acsjournals.onlinelibrary.wiley.com/doi/pdf/10.1002/cncr.24121.

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Section 8: Resources and Continued Learning

This section provides a list of resources and ongoing educational opportunities that you as a primary healthcare worker can use to deepen their knowledge about musculoskeletal sarcomas and stay updated with the latest information. The list is not comprehensive but should provide access to updated information that may be useful in your practice.

1. Further Reading and Educational Resources

It's important to continue learning about musculoskeletal sarcomas to stay informed about best practices, advances in treatment, and early detection methods. Below is a list of recommended resources for further study:

- **Online Resources:**
    - *American Cancer Society*: Information on different types of cancer, including sarcomas, with guides on early detection and treatment.
        - Website:https://www.cancer.org/cancer/types/bone-cancer/about.html
- **Journals:**
    - *The Lancet Oncology*: Regular publications on the latest research and treatment innovations for cancer, including sarcomas.
        - Website: https://www.thelancet.com/journals/lanonc/home
    - *Journal of Pediatric Orthopedics*: Articles on sarcomas in children, with special focus on early detection and treatment outcomes.
        - Website:https://journals.lww.com/pedorthopaedics/pages/default.aspx

2. Support and Networking Opportunities

Building a network of support among healthcare workers, specialists, and cancer organizations can help you stay connected with the latest information and provide guidance when you encounter challenging cases.

- This manual is accompanied by an online digital learning platform available at www.boneandjointclinic.org/sarcomalearning
- **National Oncology Networks:**
    - *Kenya National Cancer Institute (NCI)*: Provides resources for healthcare professionals, including referral guidelines and policy documents.

        - Website: https://ncikenya.go.ke/resources/#policies
    - *African Organization for Research and Training in Cancer (AORTIC)*: A pan-African organization focused on improving cancer treatment, training, and research across Africa.
        - Website: https://aortic-africa.org/

- **Local and International Cancer Organizations:**
    - *Kenya Society of Hematology and Oncology:* founded by cancer and blood disorder experts to be a catalyst in cancer and blood disorders research, to help improve patient care and stimulate capacity building for cancer care within the region and provide cancer experts and physicians involved in the treatment of cancer with a forum to discuss ideas for purposes of improving practice and treatment outcomes.
        - Website: https://kesho-kenya.org/
    - *Kenya Network of Cancer Organisations*: Offers support to healthcare workers dealing with cancer patients, as well as training and advocacy materials for improving cancer care in Kenya.
        - Website: https://kenconetwork.org/

Section 9: Monitoring and Feedback

While the primary goal of this training manual is to equip you with the skills necessary to identify and refer patients with suspected musculoskeletal sarcomas, your feedback and involvement in tracking patient outcomes are equally important. By monitoring patient progress and sharing your experiences, you help improve the effectiveness of early detection and referral systems.

1. Tracking Patient Outcomes

After referring a patient with suspected sarcoma, you can play a vital role in ensuring their journey continues smoothly by following up on their outcomes:

- **Keep a Record of Referrals**: Maintain a simple record of the patients you refer for further testing and treatment. If possible, track whether they were diagnosed with sarcoma and the type of treatment they received.
- **Follow Up with the Referral Center**: If possible, follow up with the specialists to check how the patient has progressed. This can help improve understanding of how early detection and timely referral are impacting patient care.

2. Providing Feedback on Training

Your experiences with this training are valuable, and we encourage you to provide feedback to help improve the program:

- **Confidence in Identifying Sarcoma**: How confident do you feel in spotting the signs of musculoskeletal sarcoma after completing this training?
- **Referral Process**: How well do you understand the referral process, and do you encounter any challenges when referring patients to specialized centers?
- **Suggestions for Improvement**: Let us know if there are areas where the training could be clearer or more helpful and share any ideas you have for improving the process.

3. Continuous Learning and Improvement

We encourage you to participate in ongoing learning opportunities such as refresher courses or workshops to keep up with any new developments or best practices in sarcoma detection and care. By sharing your feedback and staying informed, you help ensure that future patients receive the best possible care.

Key Takeaways:

- **Keep a record of patient referrals and follow up where possible to track outcomes.**
- **Share your feedback on the training to help improve it for yourself and others.**
- **Stay engaged with ongoing learning opportunities to continuously improve your skills.**

Conclusion

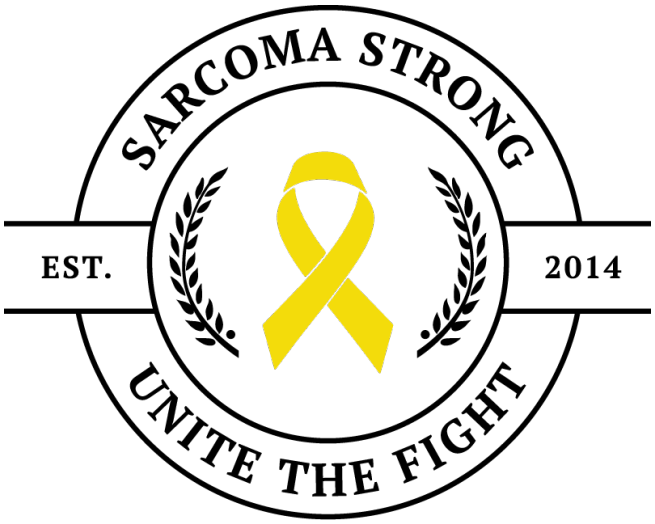
This training manual is designed not just as a one-time guide but as a continuous resource for you the primary healthcare worker. Early detection and timely referral of musculoskeletal sarcomas is critical in improving patient outcomes, particularly in resource-limited settings. As a primary healthcare worker, you play a pivotal role in recognizing the red flags and ensuring that patients receive the specialized care they need at the earliest possible stage.

By understanding the clinical signs, knowing when to refer, and working closely with referral centers, you can help patients access life-saving treatments, increasing their chances of survival and improving their quality of life. With the support of multidisciplinary teams at specialized centers, patients stand a much better chance of receiving appropriate treatment, preserving their limbs, and leading productive lives.

Through staying connected with national and international networks, utilizing further educational resources, and participating in ongoing professional development, you will continue to build your skills, ensuring that no patient is left behind due to late diagnosis or delayed care. Your swift action and keen clinical judgment can make all the difference in the lives of children, adolescents, and adults affected by these aggressive cancers.

Let’s work together, through your dedication, training, and collaboration with specialized centers, to make significant strides in improving the outcomes for those affected by musculoskeletal sarcomas.

We are most grateful for the support of the following organisations in making this project possible:



Enhancing Early Detection and Treatment of Musculoskeletal Sarcomas in Kenya A Practical Guide for Primary Healthcare Workers

Musculoskeletal sarcomas are aggressive cancers that primarily affect young people, often leading to devastating outcomes if not detected early. In resource-limited settings, the role of primary healthcare workers in identifying potential sarcoma cases and ensuring timely referral is critical to improving survival rates and quality of life for patients.

This training manual, developed as part of the **Global Surgery Advocacy Fellowship**, provides primary healthcare workers with the knowledge and tools necessary to recognize the symptoms and signs of musculoskeletal sarcomas. It serves as a comprehensive resource, offering case studies, practical scenarios, and referral guidelines to ensure that patients receive timely and effective care.

By utilizing this guide, healthcare workers are empowered to make life-saving decisions, bridging the gap between diagnosis and specialized treatment. Together, we can make a significant difference in the lives of those affected by musculoskeletal sarcomas.

"Early detection saves lives—your swift action can change the future for your patients."

The Global Surgery Advocacy Fellowship
Enhancing Early Detection and Treatment of Musculoskeletal Sarcomas in Kenya