



Barriers to Maximizing MRI Benefits, The Role of Economic Hardship and Communication Gaps

Mohammad Bsbous^{*1}, Suliman Alfaqeh^{**1}

¹Faculty of Applied Medical Sciences, Department of Nursing, Palestine Ahliya University (Palestine)

*✉ M.bassbous@paluniv.edu.ps

**✉ s.alfaqeh@paluniv.edu.ps

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Abstract: *The rising demand for MRI scans, particularly in knee imaging, presents significant challenges for medical centers due to the associated time and financial costs. This study aims to evaluate the actual benefits of MRI interventions on patient health outcomes and examine the utilization of diagnostic results in treatment planning based on MRI findings. We performed an observational study evaluating the medical records of 945 patients diagnosed with knee joint disorders who underwent MRI imaging between 2023 and 2024. The results of this study indicate that in 92% of the cases, where MRI was requested a cording to a proper scientific indication, MRI findings did not result in a meaningful influence on treatment decision-making. These findings highlight the importance of establishing a comprehensive health strategy and specific protocols for the use of MRI in patient evaluation—particularly for those with a high likelihood of requiring surgical intervention. Such protocols should account for patients' implicit and pre-existing decisions regarding treatment. Additionally, health policies must prioritize the enhancement of communication between healthcare providers and patients, ensuring that patients are adequately informed about their condition, the rationale behind proposed medical procedures, and the potential health consequences of declining treatment. Furthermore, the results underscore the necessity of enforcing labor regulations that protect workers' rights to medical leave and promote a supportive work environment that accommodates health-related changes in employees' functional capacity.*

Keywords: *Knee Disorders; MRI Overuse; Medical Waste Reduction; Treatment Planning.*

1. Introduction

The knee is the largest and one of the most biomechanically complex joints in the human body, rendering it particularly susceptible to injury. Knee injuries are associated with long-term disability and impose a substantial socio-economic burden. The overall incidence of knee injuries is estimated at 2.3 per 1,000 individuals, with the highest rates observed among those aged 15–24 years [1]. Among these injuries, ligamentous injuries comprise approximately 40%, patellar injuries 25%, and meniscal tears 10%, with the remaining 25% representing various other pathologies.

Accurate diagnosis is critical for developing an effective treatment plan. This process requires a comprehensive clinical approach, including thorough patient history, physical examination, special tests, and appropriate use of diagnostic imaging. However, in acute clinical

settings, factors such as pain, swelling, and muscle guarding can impede accurate assessment [2].

Given the high prevalence of knee injuries and the diagnostic challenges they pose, it is imperative that non-orthopedic healthcare providers possess a high degree of confidence and competence in musculoskeletal examination. Alarming, studies have shown that up to 82% of recent medical graduates lack fundamental proficiency in musculoskeletal clinical assessments [3]. Diagnostic accuracy among emergency medicine consultants can be as low as 26%, and even orthopedic consultants may miss diagnoses in approximately 28% of cases [4].

Since its introduction in the early 1980s, magnetic resonance imaging (MRI) has become a cornerstone in the evaluation of knee pathologies [5], [6]. MRI remains the standard imaging modality for assessing ligamentous, cartilaginous, and intraosseous abnormalities due to its ability to produce high-resolution, noninvasive images of soft tissue structures. It is especially effective in detecting meniscal, ligamentous, and tendon tears, as well as occult bone injuries [7], [8].

Despite its diagnostic utility, MRI has limitations, particularly in resource-limited settings. In rural areas of Palestine, MRI availability is limited, and when accessible through private centers, the cost (averaging 200 USD) is prohibitive for many patients. In the public sector, MRI scanners are centralized in major hospitals ,in the west bank there are a 3 MRI machine in the Governmental hospitals [9], with non-emergent cases facing waiting periods of four to six weeks for scanning and an additional two weeks for reporting. In light of these limitations, MRI utilization must be clinically justified and directly inform patient management, rather than being employed routinely without clear therapeutic benefit. In 2022, a total of 18,800 MRI scans were performed in Palestinian governmental hospitals [10], at an estimated cost of 3.760.000 USD .

This study represents the first investigation of its kind in Palestine to assess the clinical utility of appropriately indicated knee MRI scans in guiding treatment decisions. Furthermore, it highlights the role of economic and cultural conditions in influencing the patient's decision to accept or decline the treatment recommended by their physician, particularly in cases where patient choices diverge from radiological findings.

2. Methodology

2.1 Study Design

This study was designed as an observational analysis. The study was conducted across a group of public and private medical centers in Hebron city - Palestine, specializing in the diagnosis and management of orthopedic conditions. Data collection focused on patients presenting with chronic knee pain who underwent MRI evaluation. The study population included 945 patients for whom knee MRI was requested due to high clinical suspicion of ligamentous or meniscal injuries. Data were collected from five orthopedic centers in Hebron between 2023 and 2024. All patients were initially evaluated by orthopedic surgeons due to various knee pathologies.

Inclusion and Exclusion Criteria

Patients aged 16 to 60 years, who presented with chronic knee pain and underwent MRI imaging, with normal Laboratory investigations including complete blood count (CBC), erythrocyte sedimentation rate (ESR), C-reactive protein (CRP), and uric acid. Included patients showed no clinical or laboratory signs of knee infection or malignancy, and had MRI-confirmed surgical pathology involving one or more of the following structures: menisci, anterior or posterior cruciate ligaments, synovial membrane, articular cartilage, or extracapsular ligaments. Patients were excluded if they had elevated inflammatory markers, incidental findings of masses or metastases, nonsurgical knee pathologies, or normal MRI results.

3. Results

Among the 945 knee MRI scans performed across the five medical centers between 2023 and 2024, 732 scans fulfilled the inclusion criteria and were included in the analysis. A total of 213 scans were excluded due to findings inconsistent with the study criteria. Subsequent analysis focused exclusively on the 732 MRI reports indicating surgical pathology.

Table (1): Distribution of MRI by age

Age (yrs)	16-24	25-45	46-60
Number MRI scans	54	361	317
Percentage	7%	49%	44%
Age (yrs)	16-24	25-45	46-60

Table (2): Distribution of knee pathology by structures:

Pathology type	Number of patients
Medial or lateral or both Menisci tear	252
ACL/PCL tear (isolated)	47
Cartilage pathology (isolated)	198
Synovium Pathology (isolated)	45
Extracapsular ligaments pathology (isolated)	53
Complex pathology *	137

complex pathology means in the same mri for the same patient we recognized a surgical pathology that involves two or more of the knee soft structures (mensci, intracapsular ligamnets, extracapsular ligamnets, cartilage, synovium) **Treatment Decisions Following MRI Findings**

Among the 732 patients with MRI-confirmed knee pathologies requiring surgical intervention, only 48 patients (7%) consented to undergo surgery. The

remaining 684 patients (93%) declined surgical treatment.

Patients who refused surgery were asked to identify their primary reason for refusal from the following predefined options:

- Lack of trust in the local medical team
- Ability to tolerate and adapt to the pain without requiring surgical intervention
- Inability to take time off work or daily responsibilities for postoperative recovery
- Fear that surgical intervention would lead to progressive joint deterioration over time.

These responses were used to assess the underlying psychosocial and perceptual barriers influencing treatment decisions.

Table (3): the reasons of refusal according to the patients:

Primary reason to refuse surgery	Number of patients	Percentage
Lack of trust in the local medical team	84	11.5%
Ability to tolerate and adapt to the pain without requiring surgical intervention	185	25.2%
Inability to take time of work or daily responsibilities for postoperative recovery	188	25.6%
Fear that surgical intervention would lead to progressive joint deterioration over time	275	37.5%

Patients were asked to provide their perspective on the anticipated progression of their knee condition. They were instructed to select one of the following statements that best reflected their personal expectations regarding disease trajectory:

- a) I believe my condition will improve over time without surgical intervention
- b) I believe my condition will remain stable without significant change
- c) I believe my condition will progressively worsen and lead to substantial functional impairment
- d) I am uncertain about the likely course of my condition

Table (4): patient knowledge about the course of the disease

Personal expectations regarding disease	Number of patients	Percentage %
I believe my condition will improve over time without surgical intervention	147	20%
I believe my condition will remain stable without significant change	218	30%
I believe my condition will progressively worsen and lead to substantial functional impairment	113	15.4%
I am uncertain about the likely course of my condition	254	34.6%

4. Discussion

All study participants presented with chronic pain (persisting >6 months) and had undergone standardized stepwise therapeutic interventions, including initial rest periods, pharmacotherapy, and - in a subset of cases - physical rehabilitation. Furthermore, all MRI studies obtained for the research were clinically indicated and medically justified, having been ordered according to professional diagnostic criteria.

Furthermore, upon reviewing the MRI reports of the patients included in the study, we confirmed that the decision to proceed with surgical intervention for all 732 cases was medically justified and appropriate.

However, despite all the aforementioned factors—including the long waiting times in radiology departments and the substantial financial costs of MRI scans—the vast majority of patients declined surgical intervention for various reasons (Table 3). Upon analyzing the reasons provided for refusal, it became evident that socioeconomic factors and health literacy levels significantly influenced patient decision-making. The unique economic conditions in Palestine play a fundamental role in shaping the living priorities of patients when making healthcare decisions—decisions that may require leaving work for certain periods during treatment. Most workers also lack the privilege of changing their job nature to accommodate their new health conditions, especially since the unemployment rate among Palestinians in 2023 reached approximately 31% [6].

The Informal Employment constitutes more than half of the total workers in Palestine (excluding the agricultural sector) about 53% in 2022, where about 95% work in the informal sector, compared to 5% work in the formal sector.

The absence of economic stability among patient's particularly Palestinian private-sector workers, daily wage laborers, and those employed in Israeli territories was a significant barrier. These groups typically lack employer-provided health insurance and are often denied even the basic right to postoperative sick leave. For Palestinian workers in Israeli territories, additional legal complexities further obstruct their ability to claim medical leave or labor rights.

Additionally, the poor communication between doctors and patients has led to patients' inability to fully understand the intended purpose of undergoing MRI scans beforehand, as well as their failure to grasp the potential complications resulting from refusing treatment plans based on the diagnostic test results.

These findings highlight the importance of establishing a comprehensive health strategy and specific protocols for the use of MRI in patient evaluation—particularly for those with a high likelihood of requiring surgical intervention. Such protocols should account for patients' implicit and pre-existing decisions regarding treatment. Additionally, health policies must prioritize the enhancement of communication between healthcare providers and patients, ensuring that patients are adequately informed about their condition, the rationale behind proposed medical procedures, and the potential health consequences of declining treatment.

Furthermore, the results underscore the necessity of enforcing labor regulations that protect workers' rights to medical leave and promote a supportive work environment that accommodates health-related changes in employees' functional capacity.

We advise healthcare providers to improve their communication with patients about their diagnosis. Rather than simply ordering the correct scans, they should also clearly discuss the possible treatment pathways that may follow from the expected findings.

We further advise doctors against merely recording a patient's refusal of treatment to avoid legal responsibility for complications. Rather, they should thoroughly explain the potential medical repercussions of declining treatment—including its effects on work capacity—and seek to understand why the patient declined the recommended plan.

5. Conclusion

This study reveals a significant disconnect between the clinical value of MRI findings and their influence on treatment decisions among patients with knee pathologies in Palestine. Only a small fraction proceeded with the recommended surgical interventions. Economic instability, lack of labor protection, and limited patient understanding of diagnostic implications emerged as critical barriers. These findings underscore the urgent need for health systems to move beyond technical diagnostic excellence and embrace patient-centered approaches that address the socioeconomic realities of care. Improving physician-patient communication, establishing national MRI utilization protocols, and enacting policies that support workers' health rights are essential to ensure that costly diagnostic interventions like MRI lead to meaningful health outcomes. Without addressing these structural and communicative gaps, the potential benefits of advanced imaging technologies will continue to be undermined by preventable and systemic barriers.

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