

(CASE REPORT)



## Overcoming Operational Challenges: A Case Study of MRI Functionality in Resource-Scarce Regions

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### Abstract

Magnetic resonance imaging (MRI) is a veritable radiological diagnostic tool for the in-depth diagnosis of various ailments involving virtually all organ systems of the human body. The machinery for this radiological investigation tool is quite huge and needs installation in a spacious, well ventilated and air-conditioned room. It also must have verified working alternative power source as the essential lithium gas needed for its proper working must be kept cool at all times, and the environment where the MRI equipment is installed must always be kept at an ambient room temperature. This requirement means that a regular power supply must be assured as the lack of it may impact negatively on the functional ability of the equipment, which was procured at a great cost, its installation and maintenance also at a great deal of scarce fund. So, all care must be put in place not to endanger the perfect workings of the MRI equipment. Angry hospital workers deliberately shut off the electrical and water supply to the MRI unit in protest, aiming to force management to address their grievances. However, this action had severe consequences for the MRI machine, as its cooling system for the essential helium gas was disrupted, leading to gas depletion from the canisters. This incident underscores the critical need for uninterrupted power and cooling systems in MRI installations to ensure their proper functioning and avoid costly damage.

**Keywords:** MRI; Helium gas; Power supply; Industrial action

### 1. Introduction

MRI is a very important diagnostic tool for in-depth diagnosis of various health conditions involving virtually all organ systems of the human body<sup>1</sup>. Its availability and use are restricted by high acquisition and maintenance cost. Also limited access to basic infrastructures for accommodating this machine, as well as the need for dedicated power supply has limited its widespread use in health care diagnostic services. In low resource regions, MRI services are only available in few referral centres due to the aforementioned reasons<sup>2</sup>. In such centres, there is need to set up a proper framework to manage and maintain this valuable equipment, which is critical to improve health care access, quality and efficiency<sup>3</sup>.

### 2. Case report

In the southern region of the country, a teaching hospital, overseen by the state government through the Ministry of Health, faced a crisis when workers, organized under various associations, protested over unpaid allowances and perceived salary increments. Despite multiple meetings between one of the non-medical allied associations and hospital management, no resolution was reached. Frustrated by the lack of progress and unable to act independently due to the

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need for approval from the central supervisory ministry, the workers resorted to industrial action, effectively shutting down the hospital.

The protest involved barricading the main entrance and exit gates, preventing access to and from the hospital complex. As a result, medical staff, including physicians, nurses, and laboratory scientists, were unable to perform their duties, causing significant disruption to patient care. Even essential services like the cafeteria, which provided food for in-patients, were affected, leading to chaos within the hospital. The incident highlights the challenges faced by healthcare workers in advocating for their rights and the potential consequences of unresolved grievances in the healthcare system.

The aggrieved workers further disrupted hospital services by turning off all water supply, causing essential departments to grind to a halt and leading to unsanitary conditions within the facility. With no access to water, basic hygiene practices were compromised, posing a potential health risk to patients and staff alike. As a result, all in-patients had to be discharged and relocated to other hospitals for care.

After negotiations between the association officials and state ministry representatives, an agreement was reached, and the hospital reopened. However, it was discovered during this period of calm that the MRI machines had suffered significant damage. It was speculated that the power outage had affected the cooling system, leading to the depletion of the dedicated helium gas essential for the MRI's operation<sup>4,5</sup>. The cost of acquiring replacement helium gas was substantial, and the global helium gas shortage may have further complicated the situation.

The actions of the aggrieved workers' union not only disrupted hospital operations but also incurred significant financial losses for the hospital. The cost of acquiring replacement helium gas for the MRI machines was substantial, contributing to the financial burden caused by the shutdown.<sup>6</sup> Additionally, the global helium gas shortage further compounded the issue, potentially limiting the hospital's ability to access this essential commodity.<sup>7,8</sup> As a result, the MRI remained out of operation, underscoring the broader implications of the disruption caused by the industrial action.

Based on the damaging experience encountered, we recommend the following measures to prevent similar incidents in the future:

1. Establish a Partnership for MRI Management:

Collaborate with a financially stable entity to manage and maintain the MRI equipment.

Ensure the MRI has a dedicated power supply unit independent from the general hospital's power grid to prevent disruptions.

Facilitate professional training for all dedicated staff working in the radiology department, ensuring they possess the necessary expertise.

Utilize proficient staff from the partner entity initially, who can subsequently train hospital staff members to ensure continuity.

2. Safeguard Against Industrial Disharmony:

Implement measures to ensure that any industrial disputes or grievances do not disrupt the operation of essential medical equipment like the MRI.

Establish clear communication channels and protocols for addressing worker concerns to prevent escalation to the point of equipment shutdowns.

3. Provide Adequate Security:

Enhance security measures to safeguard both staff and equipment within the hospital premises.

Implement protocols for monitoring and protecting high-value medical equipment such as the MRI to prevent vandalism or unauthorized access.

By implementing these recommendations, hospitals can better protect essential medical equipment, maintain uninterrupted service delivery, and ensure the safety and well-being of both patients and staff.

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### 3. Conclusion

MRI services are only available in few referral centres in resource-scarce regions due high acquisition and maintenance cost. There is need to establish a veritable partnership for its maintenance, safeguard against industrial disharmony that may disrupts its continuous functional ability and provide adequate security to safeguard this equipment from vandalism or unauthorized access. This is necessary for uninterrupted MRI services which is critical to improve health care access, quality and efficiency.

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### Compliance with ethical standards

#### *Disclosure of conflict of interest*

No conflict of interest to be disclosed.

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