

Virtual Audit: Remote Monitoring of Compliance Rate of Adherence to Standard Practices

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Case Reports

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Introduction

Vijaya Hospital is the first multispecialty hospital in Chennai starting with 50 beds and growing to 750 beds since then. Currently, it is under the umbrella of Vijaya Medical & Educational Trust (VMET). VMET recognized the necessity of transitioning to virtual auditing after discovering low compliance rates among employees handling biological hazards. There were persistent complaints about employees failing to follow proper safety protocols, particularly those responsible for transporting biological waste. Common infractions included not wearing gloves, overloading biomedical waste trolleys, leaving trolleys uncovered, and failing to properly segregate waste. These unsafe practices raised significant safety concerns, such as contamination risks, needlestick injuries, and exposure to biological hazards.

advance of on-site audits. As a result, employees would comply with safety standards on audit day but revert to unsafe habits afterward. To address this, VMET decided in 2024 to implement virtual audits using security cameras, ensuring continuous monitoring and accountability.

Distinctiveness of the Practice

The implementation of virtual auditing was initiated to keep track of operations and staff around the workplaces, especially those working with biomedical hazards. The preliminary review by a primary auditor, who reviews the footage and compiles the recording of different non-compliances observed and then presents the results to the audit committee. This unique practice of virtual audit is made possible through the following mechanisms:

- **Continuous Remote Monitoring:** By utilizing security cameras placed in hallways, entry and exit points, and other critical areas where biological waste is handled, the hospital monitored the employees responsible for waste collection, segregation, and transportation. This process required adherence to strict safety protocols, which employees often fail to follow consistently. Through security camera footage, the hospital conducted audits to assess compliance. The concerned quality manager reviewed the recordings to evaluate whether employees are following the required safety



Non-compliance of PPE



Over loading of Biomedical Waste Trolleys

Fig. 1 Non-compliance on wearing PPE and overloading of trolleys

Further, Hospital also identified that the main issue stemmed from notifying employees in

procedures. The committee presented the evidence of wrongdoing to address it with the concerned staff. Footage and pictures of the employees as well as analysis of their actions was discussed with them so that they could amend their behaviors and improve operational safety while handling biological hazards.



Fig. 2 Quality manager conducting virtual audits

- Objective Assessment for Virtual Audit:** The hospital had implemented stringent procedural requirements to minimize the risk of infection and contamination. While staff were previously expected to follow these safety measures, compliance was often inconsistent, with employees adhering to protocols only during on-site audits. However, with the introduction of virtual audits, these measures were now enforced more effectively, significantly reducing health risks for both employees and patients. To enhance safety and compliance, the hospital had introduced the following key measures:
 - Mandatory use of PPE
 - Color-coded trolleys
 - Closed trolleys for containment
 - Scheduled transport of trolleys
- Inter-Facility Cooperation:** The hospital conducted sessions for their own employees as well as the third-party transport staff. These third-party transport staff were not directly reporting to the hospital authorities as the waste transportation was managed by a third party. To address this, the hospital

had strengthened collaboration with the third-party company to establish a training protocol that ensured proper safety practices were implemented and followed by its employees.



Fig. 3 Training employees on biomedical waste handling

Measured Effects

The practice was developed with an aim to improve the adherence towards waste management by the staff. The audit reports showed significant improvements as reflected below:

- Before the intervention, the compliance percentage for transporting waste with covered trolleys was 68%, 63%, and 59% during January, February, and March, respectively. After the intervention, compliance improved to 95%, 98%, and 98% during June, July, and August.
- Similarly, adherence to wearing PPE was recorded at 87%, 78%, and 85% during January, February, and March. Following the intervention, compliance increased to 96%, 96%, and 97% during June, July, and August.
- Compliance with transporting biomedical waste using dedicated trolleys stood at 67%, 68%, and 70% before the intervention and rose to 92%, 97%, and 98% after the intervention.
- The percentage of compliance for transporting waste through a predefined path was 81%, 81%, and 90% before the intervention, which improved to 94%, 98%, and 97% post-intervention.
- Compliance with transporting waste within the defined timeframe was recorded at

87%, 73%, and 91% before the intervention, increasing to 97%, 96%, and 98% after the intervention.

- Overall, compliance across all categories improved significantly, rising from 76% before the intervention to 96% after the intervention.

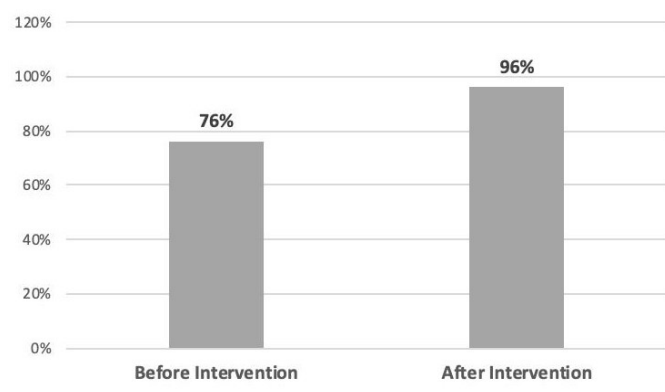


Fig. 4 Change in Compliance from before to after Intervention (%)

This initiative fostered greater engagement between hospital administration and staff by enabling continuous and impartial oversight. The hospital management benefitted through significant reduction in adverse events related to contamination and biological waste hazards. The safety of the staff also increased because of the improved compliance.

Challenges

One of the greatest challenges faced by Vijaya Hospital was the resistance of staff to adopting safer practices. Even when presented with clear video evidence of their infractions, many employees remained defensive, arguing with supervisors and refusing to acknowledge the broader safety risks their actions posed to others.

To overcome this challenge, hospital leadership implemented targeted training sessions designed to educate staff on the serious consequences of their negligence. However, true behavioral change only occurred when the focus shifted to the potential personal harm employees could face. Leaders highlighted the risks of needlestick injuries and the possibility of contracting life-threatening diseases such as HIV or Hepatitis C. They also emphasized the danger of acquiring infectious diseases

from biological materials and unknowingly transmitting them to their own families at home.

This shift in perspective proved to be the turning point. Once staff recognized that their own health and the well-being of their loved ones were at stake, their attitudes changed. A newfound awareness of personal risk led to greater compliance, fostering a safer and more responsible workplace culture.

Lessons Learned

The hospital recognized several crucial factors that contributed to the success of virtual auditing as listed below:

- **Effective Communication with Staff**

The hospital learned that employees were more likely to embrace new policies when they resonate on a personal level. Rather than enforcing rules through strict directives, the hospital shifted its approach to educating employees about the real-world risks of improper waste handling. By emphasizing the dangers of infectious disease transmission—both to patients and the employees' own families—staff became more motivated to adopt safer practices. Further, by including the key personnel like maintenance manager, housekeeping in charge etc. in discussions, the hospital ensured that the audit findings were comprehensive and that necessary improvements were successfully implemented.

- **Advantages of Virtual Auditing**

The reduced labor-intensive virtual audits helped streamline the process, allowing a single quality manager to efficiently oversee compliance using security footage. Also, the virtual audits were being conducted through a focused and manageable approach to identifying safety infractions. Since virtual audits do not rely on scheduled visits, they provide ongoing oversight, preventing employees from temporarily modifying their behavior solely for audit day.

Sustainability of Practice

Vijaya Hospital ensured the long-term sustainability of its virtual audit practice

through continuous training and the establishment of a dedicated virtual audit committee. Employees, both internal and external, underwent regular training to enhance their awareness of biological waste risks and proper handling procedures, including the use of PPE, safe transportation, and appropriate disposal. This ongoing training maintained high compliance standards and ingrained a culture of safety among staff. The VMET virtual audit committee, comprising department heads and rotating new members, played a crucial role in overseeing and sustaining the practice. By involving new employees each year, the hospital ensured knowledge transfer and continuity in safe biomedical waste management. Additionally, the hospital planned to update its Biomedical Waste Management policy to formally integrate virtual audits into its annual policy review meeting in April 2025, reinforcing compliance and sustainability. Virtual audits proved to be more time-efficient and cost-effective compared to on-site audits, as video footage was continuously backed up, allowing the quality manager to review it at any time.

These measures collectively secured the long-term effectiveness and institutionalization of virtual audits at Vijaya Hospital.

Conclusion

The implementation of virtual audits at Vijaya Hospital significantly improved the efficiency and sustainability of biomedical waste management. Through continuous employee training and the establishment of the VMET virtual audit committee, the hospital ensured long-term adherence to safe practices. The integration of virtual audits into the hospital's Biomedical Waste Management policy reinforced compliance and accountability. Additionally, the cost and time efficiency of virtual audits, compared to traditional on-site audits, further contributed to their sustainability. By leveraging technology and proactive training, Vijaya Hospital successfully institutionalized a safer, more efficient, and enduring approach to managing biomedical waste and mitigating infection risks.

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