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**Research Article**

# The Effect of Medical Equipment Maintenance on Healthcare Worker Efficiency at FMIC

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**Abstract**

**This study investigates the relationship between medical equipment maintenance and healthcare worker efficiency at the French Medical Institute for Mothers and Children (FMIC). Efficient performance by healthcare staff is critical for quality patient care, and the condition and availability of medical equipment play a vital role. Poor maintenance can cause equipment breakdowns, delays, and increased workload, negatively affecting staff performance and patient outcomes. A quantitative research approach was used, with data collected through a structured questionnaire distributed among healthcare professionals, maintenance staff, and technical personnel at FMIC. A total of 187 valid responses were analyzed using SPSS software. The independent variables studied were frequency of maintenance, response time, quality of service, equipment availability, and technical support. The dependent variable was healthcare worker efficiency. regression analyses were performed to examine relationships between variables. The analysis revealed a positive correlation between all maintenance-related factors and healthcare worker efficiency. Equipment availability and technical support showed the strongest impact, with higher t-values in the regression analysis. Regular, well-scheduled maintenance contributed to reducing downtime and improving device reliability. Although the R-squared value indicated a modest overall effect size, individual variables had significant influence on staff efficiency. An effective maintenance system enhances the operational readiness of medical equipment, which in turn supports smoother workflows and improves staff morale. The study recommends strengthening technical support, ensuring spare parts availability, continuous training, and adopting preventive maintenance strategies. These steps can improve both equipment performance and healthcare worker productivity, especially in resource-limited settings. The findings provide a basis for further research in similar healthcare environments.**

**Keywords: Medical Equipment Maintenance, Healthcare Efficiency, Technical Support, Equipment Availability, Response Time, Quality of Service, FMIC.**

**Importance of the Problem**

Modern healthcare depends heavily on medical equipment to deliver accurate diagnoses and effective treatments. In private hospitals, where service quality and patient satisfaction are essential, the smooth functioning of this equipment is especially important (Zhou and Lin, 2024). However, many hospitals face challenges in maintaining their equipment properly, which can lead to breakdowns, delays, and inefficiencies. These issues often impact the performance of healthcare workers, who rely on well-functioning tools to care for patients effectively (Zamzam et al., 2021). Doctors, nurses, and technicians need equipment to be available, reliable, and easy to use. When equipment fails or isn't maintained on time, it can interrupt workflows, cause stress, and reduce the overall efficiency of staff (WHO, 2020). Healthcare workers may need to delay procedures or find alternative ways to deliver care, which increases their workload and reduces productivity (Thilakarathna, 2021). This problem not only affects staff morale but can also delay treatment for patients and lead to financial losses for the hospital. Despite its importance, medical equipment maintenance is often neglected or handled only when problems arise

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(Tadia and Kharate, 2020). Factors like irregular service, delayed technician response, and lack of spare parts can lead to frequent equipment downtime. In private hospitals, this directly affects operational efficiency and patient trust. Yet, there is limited research that shows how maintenance practices affect healthcare worker efficiency. At FMIC, the Medical Equipment Maintenance Department plays a key role in supporting hospital operations. However, challenges remain in managing maintenance frequency, ensuring quick service, and keeping all equipment functional. This study aims to explore how effective maintenance such as timely service, equipment availability, response time, and technical support impacts the efficiency of healthcare workers. It will also consider whether different staff roles and experience levels change how maintenance issues are perceived. The findings of this research will help hospital leaders improve maintenance strategies and support healthcare staff better. By identifying the connection between maintenance and worker performance, the study will offer ways to enhance both care quality and staff productivity in private hospitals like FMIC.

**1. Frequency of Maintenance**

Regular maintenance is essential to ensure medical equipment remains functional and safe. It includes scheduled checks, servicing, cleaning, and part replacement. Higher frequency often reduces the risk of unexpected breakdowns. It helps extend equipment lifespan and ensures consistent performance. Infrequent maintenance may lead to sudden failures and inefficiency. It directly affects the availability and reliability of machines. Hospitals that maintain equipment regularly face fewer disruptions (Alsyouf, 2007). It also contributes to higher patient safety and clinical outcomes. Frequency must be balanced not too often to waste resources, not too rare to risk failure. These variables impact how efficiently healthcare staff can perform tasks.

**2. Response Time**

Response time refers to how quickly maintenance teams act after an issue is reported. Faster responses mean shorter equipment downtime. Quick action allows uninterrupted patient care. Delays in response time can lead to postponed procedures or diagnoses (Arab-Zozani et al., 2021). It reflects the efficiency of the technical support system. A prompt response builds trust between clinical and maintenance staff. Long response times can frustrate staff and reduce productivity. Monitoring response time helps in evaluating vendor or internal team performance. Hospitals often define acceptable response time in service contracts. This variable shows how maintenance delays can disrupt healthcare delivery (Corciova et al., 2020).

**3. Quality of Service**

Quality of service means how well maintenance is performed. It includes technician expertise, tools used, and adherence to standards. High-quality service ensures problems are properly fixed the first time. It reduces the recurrence of the same issue. Poor service can lead to equipment failures and safety hazards. Quality service also involves clear documentation and reporting. Reliable servicing boosts equipment performance and user confidence (Bahreini et al., 2019). Vendors with high service quality are more preferred by hospitals. It is linked with long-term equipment efficiency. This variable influences staff satisfaction and operational reliability.

**4. Equipment Availability**

Availability is the percentage of time equipment is ready for use. High availability means fewer delays in diagnosis or treatment. It's directly influenced by maintenance frequency and service quality. Low availability creates bottlenecks in clinical workflows. It may cause rescheduling of patients and affect hospital revenue. Availability is often measured in uptime percentages (Campbell and Reyes-Picknellm, 2015). Hospitals aim for over 95% availability for critical devices. It helps maintain smooth patient flow and care delivery. Technicians and clinical staff depend on reliable equipment. This variable connects technical readiness with healthcare worker efficiency.

**5. Technical Support**

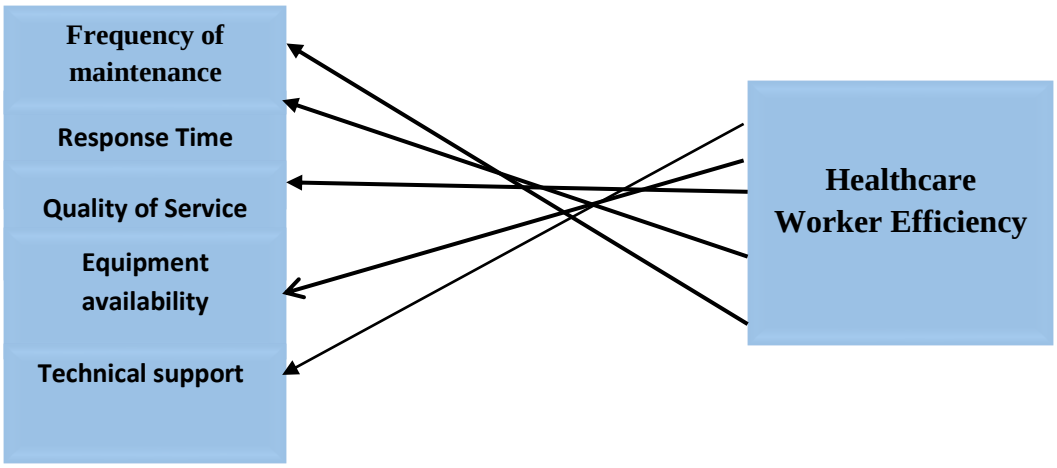
Technical support includes assistance with troubleshooting and operation. It may be internal (biomedical team) or external (vendor). Strong support helps in the quick identification of problems. It boosts the confidence of staff in using complex equipment. Poor support may result in misuse or extended downtime (Sezdi, 2016). Support can be on-site or remote, depending on the agreement. Training by support teams also improves user knowledge. Effective support ensures proper usage and fewer breakdowns. This reduces stress and improves workflow for healthcare workers. This variable affects how independently staff can handle equipment issues (Karna and Jain, 2023).

**6. Healthcare Worker Efficiency**

This refers to how well healthcare staff complete their duties. Efficiency includes speed, accuracy, and productivity in patient care. It's affected by equipment functionality and reliability. Frequent failures or delays can lower worker morale. Efficient staff can manage more patients and procedures (Li et al., 2025). Their

performance also impacts patient satisfaction. Equipment that is always available helps streamline tasks. When maintenance is reliable, staff spend less time troubleshooting. Training and technical support also boost staff confidence. This variable reflects the overall effectiveness of clinical operations (Lin et al., 2024).

**Research Conceptual Framework**




**Dependent Variable (DV):** Healthcare Worker Efficiency
**Independent Variables (IV):** Frequency of maintenance, response time, quality of service, equipment availability, and technical support.

**Research Questions**

1. How does preventive maintenance influence healthcare worker efficiency?
2. What are the relationships among Frequency of maintenance, response time, quality of service, equipment availability and technical support, and healthcare worker efficiency?
3. Are there significant variations in the perception of worker efficiency among all the demographic variables?

**Research Objectives**

1. To examine the influence of preventive maintenance on healthcare worker efficiency.

**Hypothesis**

**(H1):** Preventive maintenance has a significant positive effect on healthcare worker efficiency.
**(H01):** Preventive maintenance has no significant effect on healthcare worker efficiency.

**Literature Review**

Htet Htet Hlaing et al (2016), explored the influence of training on employee performance in private hospitals across Mandalay. It highlighted the challenges faced by HR departments in identifying skill gaps. The study targeted 580 staff members from Mingalar, Nyein, City, and Pan Hlaing Siloam Hospitals, with a sample of 237 participants selected using stratified random sampling. Data was gathered through questionnaires, interviews with key hospital personnel, and secondary sources such as previous research studies. SPSS was used for analysis. Results indicated a strong and significant link between training types, needs, and content with employee performance, all showing significance at less than 1%. Based on these findings, the study suggests continuous review and assessment of training programs. It emphasizes evaluating training before, during, and after delivery, and incorporating employee feedback to enhance future training effectiveness.

James et al (2015), explored how reward systems influence the performance of healthcare workers at a teaching hospital, specifically the University of Calabar Teaching Hospital (UCTH). It focused on the relationship between monetary and non-monetary rewards and employee performance. Data was collected through questionnaires, interviews, observations, and secondary sources such as books, journals, and online materials. Using the Chi-square method for analysis, the results showed that monetary rewards positively impacted employee performance, while non-monetary rewards had a negative effect. The study recommended that UCTH management adopt a fair and balanced reward system and emphasized the need to enhance employee motivation through effective use of monetary incentives like bonuses and fringe benefits to improve overall performance.

Mutsoli & Kiruthu (2019), said that devolution in healthcare, like other forms of decentralization, significantly reshaped governance structures within the health system. Advocates viewed devolution as a means to enhance service delivery and system performance by shifting authority and responsibilities to locally elected governments,

aiming to tailor services to specific community needs through greater local involvement. However, literature on devolution does not provide conclusive evidence of improved health sector performance. Notably, no prior study had specifically examined the impact of devolution on healthcare worker performance in Kakamega County.This study aimed to assess how devolution influenced employee performance at Kakamega County Referral Hospital, Kenya. It targeted all 400 hospital employees, selecting a sample of 120 through simple random sampling using Yamane's formula. Data was collected using questionnaires, interviews, and document reviews. A pilot study was conducted at Mumias Sub County Hospital but was excluded from final results.

Malik and Shabbir (2016), examined patient perceptions of service quality in private hospitals in Islamabad, Pakistan, and how these perceptions influence their satisfaction and loyalty. Using data from 611 patients, the study evaluated key aspects such as the hospital environment, responsiveness, communication, privacy, and safety. The results indicate that higher service quality enhances patient satisfaction, which subsequently fosters patient loyalty. Satisfaction plays a mediating role between service quality and loyalty. The study offers valuable insights for hospital administrators, encouraging them to focus on improving service delivery standards to meet patient expectations and build long-term trust.

Rosina et al (2012), said the Health Technology Assessment (HTA) has become a key element in healthcare decision-making, particularly for drugs and surgeries. However, applying HTA to medical devices remains complex. Unlike pharmaceuticals, HTA for devices focuses less on cost-effectiveness and more on decisions about procurement and integration into healthcare systems. Clinical benefits are often measured by diagnostic accuracy and how much the device improves or simplifies treatment, rather than quality of life. To properly evaluate devices, using multi-criteria decision-making approaches is recommended, combining clinical, technical, and user-related outcomes before considering cost-effectiveness. Additionally, HTA for devices involves challenges such as identifying selection and purchasing requirements, forming expert review panels, and evaluating the maintenance demands of the equipment.

Subramanian (2014) explained its success in manufacturing; Lean methodology has also shown promising results in the service sector, including healthcare. With growing pressure to offer high-quality care at reduced costs, hospitals are increasingly adopting Lean tools to eliminate waste, streamline processes, and remove non-value-added activities. The healthcare system faces significant challenges related to quality, safety, accessibility, and fairness, while costs continue to rise for all stakeholders—patients, employers, insurers, and healthcare providers. As a result, healthcare leaders and policymakers are seeking strategies to improve efficiency and maximize value. Patients themselves aim to get the best care for their money. In response, many hospitals in the U.S. are turning to Lean and Six Sigma practices to enhance performance and lower expenses. This paper explores the application of Lean tools in healthcare and presents a case study demonstrating how Lean methods helped improve staff efficiency in a medical facility.

**Instrument used for primary data collection.**
This work was carried out based on the primary data collected through the survey instrument. The survey instrument used for this work is a standardized, well-structured questionnaire. The questionnaires were employed to collect the primary data and relevant information from the employees of the French medical institute for mothers and children (FMIC). This survey instrument was designed and tested as a part of this work and proved to be reliable.

***Pre-testing***
A pilot study was conducted to obtain the preliminary assessment of the internal validity of the research survey instrument questionnaire. For this purpose, primary data were collected from 12 employees of the French medical institute for mothers and children (FMIC). The results of the pilot study confirmed the internal reliability of the instrument deployed, and hence, the same instrument was used in the identified sampling areas to collect the primary data needed for the present study.

***Survey Instrument Reliability***
The survey instrument was tested with appropriate reliability analysis comprising the computed value of Cronbach's alpha, and the alpha value for all the study variables taken up in the survey instrument is found to be well above the suggested value of 0.6 (Nunnally, 1978). The specific details of the alpha value for each of the study variables constituting the present work is shown in Table 1.

**Table 1: Details of the Measurement Scales with Corresponding Reliability values**

| S.No. | Dimensions | Cronbach Alpha |
|---|---|---|
| (i) | Healthcare Worker Efficiency | 0.781 |

| Departments | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | In-Patient | 73 | 39.0 | 39.0 | 39.0 |
| | Out-Patient | 50 | 26.7 | 26.7 | 65.8 |
| | Radiology | 21 | 11.2 | 11.2 | 77.0 |
| | Laboratory | 12 | 6.4 | 6.4 | 83.4 |
| | Others | 31 | 16.6 | 16.6 | 100.0 |
| | Total | 187 | 100.0 | 100.0 | |

| | | |
|---|---|---|
| (ii) | Preventive Maintenance Frequency | 0.823 |
| iii) | Response Time to Equipment Failure | 0.812 |
| (iv) | Availability of Spare Parts | 0.841 |
| (v) | Technical Staff Competency | 0.788 |
| (vi) | Budget Allocation for Maintenance | 0.856 |

**Population**

The French medical institute for mothers and children (FMIC) was taken as the population of the study because the study used a case study design. A total of 187 employees out of 350 employees of different departments of the French medical institute for mothers and children (FMIC) were selected, which would give in-depth coverage and analysis of the results or the findings.

**Sampling Size**

A total of 187 employees out of 350 employees of different departments and units of the French medical institute for mothers and children (FMIC) were selected.

According to the Yamane formula.

$n= N/1+N(e)^2$

$n= 350/1+350(0.05)^2$

$n=350/1+350(0.0025)$

$n=350/1+0.875$

$n=350/1.875$

$n=187$

**Results and Findings**

**Table 2: Employees Gender**

| | Gender | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| | Male | 119 | 63.6 | 63.6 | 63.6 |
| | Female | 68 | 36.4 | 36.4 | 100.0 |
| | Total | 187 | 100.0 | 100.0 | |

Table 1 presents the gender distribution of 187 respondents, with 119 males (63.6%) and 68 females (36.4%). There was no missing data, so the valid percent matches the overall percent. The cumulative percent indicates that male responses account for 63.6% of the total, and when female responses are added, the cumulative reaches 100%. This shows that males represent a larger portion of the sample compared to females. Also, Table 1 shows the percentage distribution of respondents across hospital of five hospital departments. The highest percentage (39.0%) of participants came from the first department. The second department accounted for 26.7% of the total respondents. Departments three and four had 11.2% and 6.4% respectively. The fifth department included 16.6% of the participants. In total, the data represent 100% of the study sample with no missing responses.

**Hypothesis Testing**

**Proposed Regression line**

HWE= B0 + B1 (FOM) + B2 (RT) + B3 (QOS) + B4 (EA) + B5 (TS)

HWE= 2.879+ 0.196 (FOM) + 0.004 (RT) + .013(QOS) + 0.182 (EA) + 0.180 (TS)

This can be interpreted as 1unit change in FOM, RT, QOS, EA, and TS, which will bring about 2.879, 0.196, 0.004, .013, 0.182, and 0.180 units of positive changes in HWE, respectively. The dependency effects of healthcare worker efficiency levels on dimensions like Frequency of maintenance (FOM), response time (RT), quality of service (QOS), equipment availability (EA), and technical support (TS) among employees of the French medical institute for mothers and children, is defined hypothesis in H1 and H0 and their results are shown in Table 2, as an outcome of multiple regression model conceptualized. From the results, it can be inferred that the F value of 3.210 is found to be significant at the 5 percent level, and hence, the null hypothesis (H0) is rejected, and H1 is accepted. These results suggest that Healthcare worker efficiency depends on the group of 5 Healthcare worker efficiency dimensions in the employees of the French medical institute for mothers and children. Further, the adjusted R-squared value of 0.563 from table-2 indicates that 56 percent of the Understanding levels factor affecting healthcare worker efficiency depend on this group of 5 dimensions, healthcare worker efficiency in FMIC. Also, the 't' values of 1.179, 0.028, 0.187,1.314, and 1.286, corresponding to healthcare worker efficiency dimensions such as Frequency of maintenance (FOM), response time (RT), quality of service (QOS), equipment availability (EA), and technical support (TS) are found to have significant effects on the model conceived. At the French Medical Institute for Mothers and Children (FMIC), the analysis revealed that equipment availability had the most substantial influence on healthcare worker efficiency, with a t-value of 1.314 the highest among all independent variables tested. This finding highlights the critical role that accessible and functional medical equipment plays in enhancing staff performance. When equipment is consistently available, healthcare workers are able to perform their duties without delay, leading to more efficient patient care. The institute's strong maintenance practices ensure that equipment breakdowns are rare, and any potential downtime is minimized through timely access to spare parts and responsive technical teams. As a result, medical procedures and diagnostics are carried out without interruption, supporting a smooth clinical workflow. Furthermore, FMIC follows a well-structured preventive maintenance schedule, which not only maintains equipment reliability but also reduces the risk of unexpected failures. This operational readiness helps healthcare professionals focus more on patient care rather than dealing with equipment issues, ultimately leading to improved efficiency, productivity, and quality of service.

Likewise, technical support at the French Medical Institute for Mothers and Children (FMIC) demonstrates a strong positive influence on healthcare worker efficiency, as reflected by the second-highest t-value of 1.286 in the regression analysis. This indicates that the presence of effective and responsive technical support services contributes meaningfully to smooth clinical operations. When equipment malfunctions or requires attention, the maintenance team responds promptly, minimizing delays in patient care. The technical support staff at FMIC are well-trained, experienced, and possess the necessary skills to handle complex medical equipment issues efficiently. In addition, the institution invests in regular technical training programs to enhance the capabilities of maintenance personnel, ensuring they remain updated with the latest technologies and troubleshooting methods. This proactive approach not only improves equipment uptime but also builds trust among healthcare workers, knowing that expert support is readily available. As a result, staff can focus more on their clinical responsibilities, leading to better workflow, higher productivity, and improved service delivery.

**Table 3: Regression**

**Model Summary**

| Model | R | R Square | Adjusted R-Square | Std. Error of the Estimate |
|---|---|---|---|---|
| 1 | .285[a] | .081 | .56 | 4.34865 |

a. Predictors: (Constant), Technical Support, Quality of Service, Response Time, Equipment Availability, Frequency of Maintenance

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 303.509 | 5 | 60.702 | 3.210 | .000[b] |
| | Residual | 3422.855 | 181 | 18.911 | | |
| | Total | 3726.364 | 186 | | | |

a. Dependent Variable: Health Care Worker Efficiency

b. Predictors: (Constant), Technical Support, Quality of Service, Response Time, Equipment Availability, Frequency of Maintenance

**Coefficients[a]**

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|---|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 11.879 | 2.899 | | 4.098 | .000 |
| | Frequency of Maintenance | .196 | .166 | .129 | 1.179 | .000 |
| | Response Time | .004 | .155 | .003 | .028 | .000 |
| | Quality of Service | .013 | .071 | .015 | .187 | .000 |
| | Equipment Availability | .182 | .138 | .115 | 1.314 | .000 |
| | Technical Support | .180 | .140 | .118 | 1.286 | .000 |

a. Dependent Variable: Health Care Worker Efficiency

The t-value of 1.179 for the frequency of maintenance indicates a noticeable and meaningful impact on healthcare worker efficiency at FMIC. This suggests that regular and timely maintenance of medical equipment contributes positively to staff performance. At FMIC, maintenance activities are conducted routinely according to established schedules, ensuring minimal disruptions in equipment functionality. By preventing unexpected breakdowns, frequent maintenance enhances the dependability of medical devices, which is crucial for continuous patient care. This proactive approach allows healthcare workers to rely on consistently functioning equipment, reducing stress and delays during clinical procedures. Ultimately, proper maintenance practices support a smoother workflow, enabling healthcare professionals to perform their duties more efficiently and effectively.

The quality of service with ‘t’ value of .187 also causes significant healthcare worker efficiency The quality of service, reflected by a t-value of 0.187, shows a modest but relevant impact on healthcare worker efficiency at the French Medical Institute for Mothers and Children (FMIC). This suggests that even though the effect is not very strong statistically, a reliable maintenance service still plays an important role in supporting clinical operations. At FMIC, the maintenance team responds promptly when technical issues occur, ensuring that equipment is restored to working conditionswith minimal delay. The professionalism and technical competence of maintenance staff contribute to timely and effective repairs. As a result, equipment downtime is reduced, helping to maintain the flow of patient care. High-quality maintenance ensures medical devices operate safely and efficiently, aligning hospital standards and enabling healthcare workers to perform their tasks without interruptions. More specifically, response time among employees at the French Medical Institute for Mothers and Children demonstrates a limited but noteworthy influence on healthcare worker efficiency, indicated by the lowest t-value of 0.028. Although statistically insignificant, the timeliness of maintenance response plays a practical role in sustaining operational efficiency. When medical equipment fails, rapid response from technical teams minimizes disruptions in clinical procedures. Short repair times reduce delays in patient care and support healthcare staff in maintaining workflow continuity. Conversely, delayed response times can increase stress and hinder performance. The presence of an efficient reporting and troubleshooting system ensures that equipment issues are addressed promptly, reinforcing consistent service delivery and helping staff perform their duties effectively. Furthermore, the professionalism and technical expertise demonstrated by the maintenance personnel contributed to the quality of repairs and reinforced the trust of healthcare staff in the system. Equipment that functions reliably and meets operational

standards improves workflow and supports accurate diagnosis and treatment. The maintenance service at FMIC upholds hospital requirements, ensuring safety and efficiency in the use of medical devices. Therefore, even though the quality of service shows a lower t-value in the analysis, it plays a critical role in enhancing healthcare worker productivity and maintaining high standards of patient care. The quality of service in medical equipment maintenance, as indicated by a t-value of 0.187 in the regression analysis, demonstrates a moderate yet meaningful influence on healthcare worker efficiency at the French Medical Institute for Mothers and Children (FMIC). While the statistical impact may not be as strong as other variables, the role of service quality remains vital in ensuring uninterrupted healthcare delivery. Timely and reliable support from the maintenance team ensures that medical equipment is repaired quickly and effectively whenever an issue arises. This prompt response minimizes equipment downtime, allowing healthcare workers to carry out their duties with fewer disruptions and delays.

***Variations on Health Care Worker Efficiency with gender category***

The variations in worker efficiency between male and female staff, taken up and its results are shown in Table 3, as an outcome of independent sample t-test. From the results of this independent sample t-test, it can be inferred that the t value of 1.455 corresponding to Health Care Worker Efficiency is found to be significant at 5 percent level.

**Table 4: Result of t-test-Gender**

| **Group Statistics** | | | | | | | |
|---|---|---|---|---|---|---|---|
| Dependent Variable | Gender | N | Mean | Std. Deviation | Std. Error Mean | T-value | Sig. |
| Health Care Worker Efficiency | Male | 119 | 22.7563 | 5.27059 | 0.48315 | 1.455 | 0.000 |
| | Female | 68 | 21.9265 | 2.49965 | 0.30313 | | |

Independent Variable: Gender; *Significant at 5 percent level

*Source: Computed from primary data*

This result suggests that Health Care Worker Efficiency varies significantly with the gender category of the employees considered as the grouping variable. More specifically, the mean value of 22.7563 estimated for the gender category male is significantly higher than the estimated mean value of 21.9265 for the gender category female. This result suggests that the Health Care Worker Efficiency is significantly higher for the gender category male than that of female among the FMIC staff members.

**Conclusion**

- Regular maintenance of medical equipment significantly improves the efficiency of healthcare workers by ensuring devices are functional and reliable during clinical procedures. When equipment operates without frequent breakdowns, it reduces interruptions in patient care and allows healthcare professionals to perform their tasks more smoothly and confidently.
- The availability of medical equipment when needed has a strong influence on the overall workflow in healthcare settings. Consistent access to functioning machines minimizes delays, reduces the time healthcare providers spend waiting for repairs or alternative tools, and enhances the continuity of patient services.
- Technical support plays a vital role in healthcare efficiency. Skilled and responsive maintenance teams enable faster resolution of equipment issues. When technical staff respond promptly and effectively, it prevents prolonged equipment downtime, reduces staff frustration, and supports uninterrupted medical services.
- The study findings show that a higher frequency of scheduled maintenance reduces the risk of sudden equipment failures. Preventive maintenance helps identify potential issues before they become major problems, thus ensuring safer and more reliable use of medical devices in patient care.
- Even though some variables like quality of service and response time had lower statistical impact, they still contribute meaningfully to healthcare worker performance. Timely responses and consistent service standards reinforce trust in maintenance systems and support overall operational stability.
- The research highlights the importance of having adequate spare parts and properly trained technicians. With immediate access to necessary components and competent staff, equipment downtime is minimized, allowing healthcare professionals to maintain productivity and focus on patient care.

- Overall, the study concludes that efficient medical equipment maintenance systems not only preserve equipment functionality but also contribute to higher staff morale, improved clinical outcomes, and better utilization of hospital resources. These benefits underscore the value of investing in robust maintenance infrastructure.

**Conflict of Interest**

The authors affirm that no conflicts of interest are linked with this publication. The research was conducted autonomously without financial or non-financial assistance from external entities.

**Author Contribution Statement**

The author meticulously crafted the study, devised the methodology, executed the investigation and data analysis, composed the original manuscript, and undertook the review and editing of the document. The author autonomously executed every aspect of the research and the development of the manuscript.

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