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An observational study on the comparative evaluation of kaya kelp initiative implementation at government hospital in the western region of Maharashtra

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Abstract

Introduction: The Kayakalp Initiative, launched under the Swachh Bharat Abhiyan by the Ministry of Health and Family Welfare, aims to enhance cleanliness and hygiene standards in healthcare facilities. This study aimed to assess the implementation of the Kayakalp Initiative. Specific objectives included conducting an internal audit and evaluating initiative implementation, comparing state and internal audit scores, analyzing variations in Kayakalp parameters and identifying contributing factors, predicting scores for the next year's Internal Audit, and recommending digital solutions for quality improvement.

Material and Methods: Data was collected using the Kayakalp Secondary Care Level Checklist through direct observation, staff interviews, and record reviews to evaluate cleanliness, hygiene, and other thematic areas.

Results: The state audit revealed high compliance with cleanliness standards, while the internal audit indicated a marginal decline. Thematic analysis showed improvements in Waste Management and Infection Control but highlighted declines in Hospital/Facility Upkeep, Sanitation & Hygiene, Beyond Hospital Boundaries, and Eco-friendly practices. Also, with the help of statistical calculation, the study predicted the score of the next Kayakalp audit.

Conclusion: The Kayakalp program requires ongoing supervision and monitoring to sustain improvements. Incorporating digital technologies like mobile apps and IoT solutions can enhance hospital cleanliness standards and promote sustainability. The successful implementation of such technology at Government Hospitals can provide a model for other healthcare facilities.

Keywords: Kayakalp Initiative; Swachh Bharat Abhiyan; Hospital Hygiene and Cleanliness; Quality Improvement In Healthcare

1. Introduction

Maintaining a clean environment in healthcare facilities is essential for infection prevention, reflecting a culture of care for patients, staff, and visitors. [1] Public healthcare facilities play a crucial role in societal health protection, with cleanliness being fundamental for quality and patient satisfaction. [2]

Quality healthcare, defined by patient satisfaction and service utilization, relies on effective Quality Improvement (QI) strategies such as Kaizen, Lean, and Six Sigma methodologies. [3,4,5]

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The Swachh Bharat Abhiyan was introduced in 2014 by the Prime Minister of India, emphasizing cleanliness in public spaces. [6] In 2015, the Ministry of Health and Family Welfare launched the Kayakalp Initiative to promote and reward high cleanliness, hygiene, and infection control standards in public health facilities, awarding cash prizes to the facilities. [7]

The Kayakalp Initiative aligns with the Indian Public Health Standards (IPHS), providing guidelines adaptable across healthcare levels, and addressing key areas like infection control, waste management, and hygiene. It mitigates hospital-acquired infections, which globally impact millions annually, imposing substantial healthcare costs. [8]

Award criteria for Kayakalp combine weighted scores from thematic areas (85%) and patient satisfaction (15%). [9] To qualify for awards, facilities must meet prerequisites, including Cleanliness and Infection Control Committees and periodic assessments. [10] This initiative exemplifies efforts to elevate healthcare standards and enhance patient outcomes.

Evaluating its implementation helps identify best practices and areas needing improvement, offering valuable insights for overcoming challenges. The study aimed to assess the implementation of the Kayakalp Initiative at this Government Hospital, by observing its application, comparing state and internal audit scores, analyzing variations in Kayakalp parameters and identifying contributing factors, predicting scores for the next year's Internal Audit, and recommending digital solutions for quality improvement. Such studies can contribute to hospitals' evidence-based data for policymaking, aiding resource allocation and targeted interventions in healthcare facility management. [11]

2. Material and Methods

This was a cross-sectional observational study conducted at a Government Hospital in the Western Region of Maharashtra, utilizing the Kayakalp Secondary Care Level Checklist as the primary data collection tool. [12] Data was collected through direct observation, staff interviews, and record/documentation reviews.

Study Population and Period:

The study was conducted for two months. The study participants included the hospital staff involved in the Kayakalp Initiative.

Sampling Procedure: Participants were selected purposively based on their roles in the initiative.

Data Collection Procedure:

The Kayakalp Assessment Checklist was used for conducting the internal audit, incorporating thematic areas like hospital upkeep, waste management, infection control, and eco-friendly practices.

Data collection involved the following methods:

- Observation (OB): Assessing infection control protocols, waste segregation, signage, etc.
- Staff Interviews (SI): Assessing staff practices and competencies relevant to this initiative.
- Record Reviews (RR): Assessing hospital records like Kayakalp audit scores, hospital key indicators, housekeeping checklists, infection control committee reports, etc.

2.1. Tool's Scoring System:

- Full Compliance (2 marks): All requirements met.
- Partial Compliance (1 mark): At least 50% compliance.
- Non-compliance (0 marks): Less than 50% compliance.

Final scoring was done based on Thematic Areas, Criteria, and Checkpoints, with clear guidelines for verification. [12]

2.2. Ethical Considerations

Ethical approval was sought, and due to the non-invasive nature of the study, an exemption from written consent was considered. Formal permissions were obtained from hospital authorities before initiating data collection. Participant

data was handled with strict confidentiality, ensuring transparency and adherence to ethical standards throughout the study.

2.3. Data Analysis

The total score was calculated with the standard formula-filled checklist in the Excel format given by the Kayakalp initiative. [13] Further analysis was done using thematic methods to identify compliance trends and areas requiring improvement.

3. Results

- The Kayakalp Assessment Checklist was used to calculate the scores of each thematic area, and overall scores and to identify the common contributing factors affecting the overall Kayakalp Score.

Table 1 Performance Comparison of Kayakalp Scores (2022 State vs 2023 Internal)

	Overall Score in Percentage	
The state audit Kayakalp score	73.57%	2022
The internal audit Kayakalp score	71.00%	2023

The above table no. 1. compares Kayakalp and eco-friendly scores from the state audit 2022 to the internal audit 2023, showing a difference of 2% in both scores.

Table 2 Thematic Area Comparison of Kayakalp Scores ((2022 State vs 2023 Internal)

Thematic Area	**The state audit Kayakalp Score 2022 (%)**	**Internal audit Kayakalp Score 2023 (%)**	**Difference in the score (%)**
Hospital/Facility	63	59 ↓	- 4
Sanitation & Hygiene	81	77 ↓	- 4
Waste Management	81	85 ↑	+ 4
Infection Control	82	92 ↑	+ 10
Support Services	42	42	0
Hygiene Promotion	34	38 ↑	+ 4
Beyond Hospital Boundary	69	55 ↓	- 6
Eco-Friendly	63	49 ↓	- 4

The above table no. 2 shows the fluctuation of individual scores of thematic areas based on Kayakalp's overall scores between the previous year's state audit (2022) and the next year's internal audit in 2023.

- To project future scores for Internal Audit, the yearly rate of change for each thematic area was calculated using the 2022 and 2023 scores.

Rate of Change = (Score in 2023 − Score in 2022) / Score in 2022

Table 3 Rate of Change in percentage for each thematic area

Rate of Change (2022-2023)		
A. Hospital/Facility	(59 – 63) / 63 = − 0.0635	(-6.35%)
B. Sanitation & Hygiene	(77 – 81) / 81 = − 0.0494	(-4.94%)

C. Waste Management	(85 – 81) / 81 = 0.0494	(4.94%)
D. Infection Control	(92 – 82) / 82 = 0.12195	(12.2%)
E. Support Services	(42 – 42) / 42 = 0.00	(0.0%)
F. Hygiene Promotion	(38 – 34) / 34 = 0.1176	(11.76%)
G. Beyond Hospital Boundary	(55 – 69) / 69 = – 0.2029	(-20.29%)
H. Eco-Friendly	(49 – 63) / 63 = – 0.2222	(-22.22%)

- Considering the rates of change the predicted scores for 2024.

Projected Score of Internal Audit for 2024 = Score in 2023 × (1 + Rate of Change)

Table 4 Projected Score of Internal Audit 2024 for each thematic area

Thematic Area	**Internal Audit Score (2023)**	**Yearly Rate of Change (%)**	**Projected Score for Internal Audit 2024 (%)**
A. Hospital/Facility	59	-6.35	55.40
B. Sanitation & Hygiene	77	-4.94	73.18
C. Waste Management	85	+4.94	89.34
D. Infection Control	92	+12.20	103.00
E. Support Services	42	0.00	42.00
F. Hygiene Promotion	38	+11.76	42.47
G. Beyond Hospital Boundary	55	-20.29	43.73
H. Eco-Friendly	49	-22.22	38.14

- The overall predicted score of the Kayakalp for 2024 was calculated by taking the average of the projected scores for all thematic areas.

The overall predicted Kayakalp score of internal audit for the year 2024 is approximately **54.78.**

Based on the insights of above table no. 4, the following areas are identified

3.1.1. Declining Areas

Areas like Beyond Hospital Boundary and Eco-Friendly faced significant declines (20.2% and 22.2%, respectively). These trends are concerning and may imply resource allocation issues or diminishing focus on these essential thematic areas. Also, Hospital/Facility and Sanitation & Hygiene needs improvements.

3.1.2. Stable Areas

Support Services remain stable, with a projected score of 42.00 indicating a need to encourage development in this area to avoid stagnation. It can be detrimental if other areas are improving.

3.1.3. Improving Areas

Infection Control and Waste Management are projected to improve, which can boost overall performance if sustained. It shows the highest positive change (12.2%), emphasizing a successful focus in this area.

3.2. Common contributing factors affecting the overall Kayakalp Score

- The absence of standardized documentation processes led to inconsistencies in recording audit findings, which resulted in incomplete and inaccurate data.

- Relying on manual documentation is time-consuming and resource-intensive, diverting staff attention from critical tasks.
- A lack of evidence-based documentation restricted the ability to track progress and make informed decisions. It becomes challenging to identify areas needing improvement and to justify resource allocation effectively.
- The absence of real-time monitoring systems for waste management resulted in overflow, improper disposal, and non-compliance with hygiene standards in a few wards.
- Insufficient staff with multiple responsibilities given to most of them, increased their workload and burnout among existing staff, compromising their ability to maintain hygiene standards.
- No sensitizing training given to the staff to enhance their skills and knowledge regarding Standard Operating Procedures (SOPs) for hygiene and cleanliness, led to non-compliance and inconsistent practices.
- Inadequate infrastructure, such as poorly maintained toilets, waste disposal systems, and insufficient restroom facilities.
- There is no standard way of monitoring or supervision process for the efficiency and effectiveness of staff responsible for cleanliness and hygiene.

4. Discussion

The study conducted an internal audit and compared 2023's internal assessment of Kayakalp Initiatives in Government Hospital in the Western Region of Maharashtra, with the previous year's state audit scores.

With reference to the results and identified gaps, strategies are proposed to enhance the scores in areas experiencing decline, particularly Beyond Hospital Boundary and Eco-Friendly, which are becoming increasingly crucial for sustainability and community health.

Ongoing monitoring of score changes and the effectiveness of interventions in targeted areas should be essential. Regular assessments will provide timely insights into whether implemented strategies are yielding positive results.

Based on the monitoring findings, hospital should consider reallocating resources towards significantly underperforming areas to address the observed declines, which can ensure a holistic approach to healthcare quality improvement. The study's strength lies in its detailed observations to identify the contributing factor for decreasing the overall Kayakalp score.

One of the objectives of the study was to give recommendations based on the findings and outline how digital technology can transform healthcare quality.

- Development of a Mobile Application to enhance the efficiency and accuracy of the assessment and evaluation process.
- The proposed features and their expected advantages of the Mobile Application will be:
- User-friendly interface for auditors with a guided upload process for findings, photos, and geotags to streamline data entry.
- Mobile app compatibility (iOS and Android) with offline data entry and sync capabilities. Real-time collaboration for multiple auditors.
- Dashboard for a quick overview of ongoing and completed assessments.
- Secure login and authentication for authorized access. Digital checklist reflecting audit criteria.
- Inbuilt notification system to alert auditors about pending tasks, deadlines, or updates related to the audit process. [14]
- The Internet of Things (IoT) can further streamline data collection, analysis, and real-time monitoring.
- For example, implementing IoT in waste management can significantly enhance efficiency, sustainability, and compliance with cleanliness standards.
- Smart bins with fill-level sensors for real-time waste monitoring, optimizing collection routes and preventing overflow.
- RFID tags on waste bins for tracking waste type and facilitating efficient recycling.
- Environmental sensors for air quality monitoring near waste disposal areas to identify health hazards.
- GPS-enabled waste collection vehicles for tracking routes, reducing fuel consumption, and enhancing efficiency.
- Smart waste compactors using IoT technology for automatic waste compaction, space optimization, and cost savings.
- Temperature sensors in hazardous waste bins to ensure safety compliance and detect abnormalities.

- Blockchain integration for creating transparent records of waste management activities, ensuring traceability and accountability.
- Data Analytics for Predictive Maintenance
- The utilization of data analytics from IoT devices can predict maintenance needs, allowing proactive measures to address potential issues before they impact healthcare standards.
- Development of digital training modules and materials on infection control, waste management, and hygiene. [15]
- Implementation of e-learning platforms and mobile apps for staff to access training anytime, anywhere, promoting continuous learning and skill enhancement. Use gamification techniques and interactive simulations to enhance engagement and retention of training content among healthcare personnel. [16]
- Government hospital infrastructure can be enhanced cost-effectively by deploying IoT sensors at entrances that can monitor foot traffic and trigger sanitation protocols. Smart glass windows regulate sunlight exposure, reducing the need for artificial lighting. [17]
- Staff monitoring with wearable devices can ensure hygiene compliance and enables real-time performance tracking. [18]
- Smart restroom fixtures with sensors and self-cleaning mechanisms improve toilet hygiene and reduce manual maintenance. [19]
- Digital signage and interactive kiosks provide dynamic content delivery, enhancing patient and staff engagement. [20]

AI-powered surveillance cameras with anomaly detection enhance safety measures by promptly identifying and resolving hazards. [21]

5. Conclusion

The Public Health Implications of the Kayakalp Initiative are significant, as it extends the emphasis on cleanliness from public spaces to healthcare facilities, recognizing their crucial role in community health.

Implementing these digital technologies within the Kayakalp initiative can lead to significant improvements in healthcare quality, operational efficiency, and patient safety. By addressing identified gaps through innovative solutions, the initiative can enhance the overall healthcare environment, ensuring that facilities meet and exceed hygiene and safety standards.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflict of interest.

Statement of informed consent

Informed consent was obtained from all interviewed hospital staff included in the study.

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