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Original Research Article

Compliance, Quality System and Standards for Control and Prevention of Healthcare - Associated Infections

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ABSTRACT

Background: Quality standards implementation in multispecialty hospitals provides insight on the structure and process related to outcome and serve as instrumental indicators to improve health care. As a consequence, it is important to evaluate quality system and implement ways of continuous quality improvement more efficiently in order to reduce the differences in the operational process and its outcome for preventing healthcare-associated infections (HAIs).
Objectives: To study and evaluate the quality system implementation in multispecialty hospitals with respect to structure, process and outcome in hospital associated infections.
Methodology: The study is based on patient centered standards and hospital infection control measures. Information was gathered from doctors, nurses and other technical staff in the hospitals through discussions and personal observations. A questionnaire was given to the patients to assess their satisfaction. Other data were collected by studying relevant records in the healthcare institution.
Results: Study reveals that the structure, process and outcome measures, when assessed showed moderate results. Facility, manpower qualification and competency are met from 50-70% compliance. Process showed 70% of compliance to the standard. The outcome showed good results, i.e., patient satisfactory rate was 80% when analyzed with 100 patients.
Conclusion: Quality care is a vital activity for all members of the interdisciplinary team in hospitals. It is important to implement the quality system which can be executed and monitored by using compliance measures in the routine process of the hospital in order to improve the standard of patient health care.

Keywords: health care associated infections program, quality standards, quality indicators, quality assurance, and documentation.

INTRODUCTION

Quality management system is a process which focused on procedure that consistently meets quality service subsequently leads to patient's satisfaction. In India, National Accreditation Board for Hospital and Health Care Providers (NABH) is an authorized body to grant accreditation for all healthcare organizations. Healthcare quality system implies that patients receive high level of care, understandable education, communication and continuous evaluation of patient feedback. Major function of Health care quality system is to assure patient requirements are attended fully. [1] Main criteria of quality is to achieve adherence in all the procedures, process which includes care for patients, compliance to treatment protocols, patient feedback and addressing the feedback, documentation, and staff approach. Implementation of

quality system in a healthcare organization makes possible uniformity in systems and processes. Hospital performance with respect to quality improves when quality system in place. Thus quality system acts as a medium for focusing patient needs and expectations for healthcare organization.

Evaluation of healthcare quality system helps us to drive necessary improvement when found short fall in quality. Clinical quality indicators are used to evaluate the quality care and identify the areas for improvement. [2] Structures, processes or outcome are considered as clinical performance measures to be assessed within the scope of quality improvement activities. [3] Structural indicators refer to health system characteristics that affect the system ability to meet the health care needs of individual patients or a community for e.g. availability of technologist (hours/day) as per the workload, strategy to identify and prevent errors during diagnosis. The process indicators assess the type of service provided to the patient and how well it was done for eg time taken to release the results of received samples. The outcome indicators stats health or events that follow safe care and that may be affected by healthcare. Outcome is to quantify the desired and undesired consequences by implementing quality indicator through quality system and monitor activities in health care. Indicators may provide insight in the structure and process aspects of quality care that are related to outcome.

Effective quality measures starts with process, structure, or outcome with improved patient health care that associates with clinical research. Quality indicators are considered principally important in improving health structures, processes, and outcomes. [4] Quality indicators act as a base for improving process quality of patient care.

Globally, hospital acquired infections affect more than 1.4 million patients in a year. In developing countries ICU acquired infection rate is 3 times high when compared to developed countries; Infection due to medical devices in developing countries are 13 fold more compared to USA. [5] Various guidelines are available to suggest how to control Health care associated infections. [6] Health care associated infection prevention implementation is not effectively supported though it has extensive quality strategies to reduce infection. [7] Accreditation helps to achieve continuous improvement in quality of care in hospitals. [8] Fault in system and process due to non effective implementation of quality system when compared to individual capability. [9] Basically HAI are caused by cross transmission of microorganisms. The transmission can be through nose, urinary track and fluids. The main reason for HAI is low hygiene especially at ICUs.

Hospital acquired infection affects patient about 1 in 10 after getting admitted (CDC, 2004). Thus, main concern is to reduce hospital infections and need to study and evaluate quality system as per standard process to effectively implement quality systems in the entire hospital system. Our objective of the study is to evaluate and analyze the quality standard compliance in multispecialty hospitals as per the national NABH standards in hospital associated infection areas.

METHODOLOGY

The study was carried in multispecialty hospitals. The sources of data are doctors, nurses, patients and relevant records maintained in the hospital. This study is focussed on understanding addressing the quality principles in connection with following HAI guidelines among staff. Based on the interaction with mentioned personnel the required training was planned. After the training post knowledge of, idea and mindset of staff, HAI acquisition, staff adherence to infection prevention practice as per regulatory guidelines among staff were evaluated. Data were collected from doctors and nurses in the hospital through informal interview and

personal observations. A questionnaire was given to the patients/patient parties to assess their satisfaction. Secondary data were collected by studying relevant records in the operational process of hospital. The data obtained is represented and discussed.

During the initiation of this study, a survey was carried out to know existing situation which includes the facility, resource and machines as per quality standard NABH. After the system study, corrective actions were taken to address the gaps. This includes quality manual, procedure, forms and format that are used during processes. [10]

Job related training was given to the hospital supervisors and other staff at hospital to facilitate implementation of action plan as per the NABH standard requirements. Quality system documents were developed which ensure proper process documentation. To check effective follow up, internal audit (IA) was done and nonconformities were closed to advance service quality. To bring best quality in service corrective actions were taken to develop with the aim of quality treatment to patient and patient satisfaction, cleanliness of toilets and surroundings, timely reporting of investigation results, compliance to bio-medical waste disposal rules, equipment calibration, checking test results, infection control measures, documentation, and process review for improvement. After implementation of quality system, a final audit was carried out to attain certification by NABH. Different measures were used to analyse the institution performance such as inspection, customer audit, consultant assessment and internal evaluation to keep continuous quality improvement.

RESULTS

During the study we have observed following activities given in Table I which are important practices in the implementation of quality system in clinical area and need to comply with NABH standard guidelines.

Table I. Compliance of clinical measures inspected in evaluation of quality system practice in hospital infection control

Clinical measures	Quality system practice
Structure Measures	• Description and documentation of roles and responsibilities Qualification and competency skills of personnel responsible for HIC • Proper storage areas for the BWM process • Qualification and training of infection control nurse
Process Measures	• Documentation of HIC program. • Frequency of swab culture in OT • Awareness of staff on standard precautions to prevent infections, • Availability of policy and procedures • Documentation of equipment cleaning and sterilization Segregation of BMW as per the rules • Use of protective equipments by the collection staff in the BMW department • Periodic in-service training for the staff • Monitoring compliance in hand hygiene procedure • Documented policies and procedures on engineering controls to prevent infections • Pre exposure prophylaxis • ACLS training, written policies and procedures, availability of consent forms in local language • Documentary evidence for quality improvement of nursing and complete patient care • Use of appropriate statistical tools for root cause analysis by management • Monitoring effectiveness of training constantly • Effective housekeeping • Conducting audits at regular intervals
Outcome Measures	• Surveillance/verification process to analyze infection, risks and it trends

The observations are categorized as per the structure, process and outcome. The cycle of continuous quality improvement is given in the Figure 1 which depicts the involvement of qualified personnel with specific training on relevant procedure should be team and task oriented and problem based, and are most effective when it includes workshops, bedside teaching, or any training models in order to attain efficiency in the work process by evaluation which makes flow cycle around the subject.

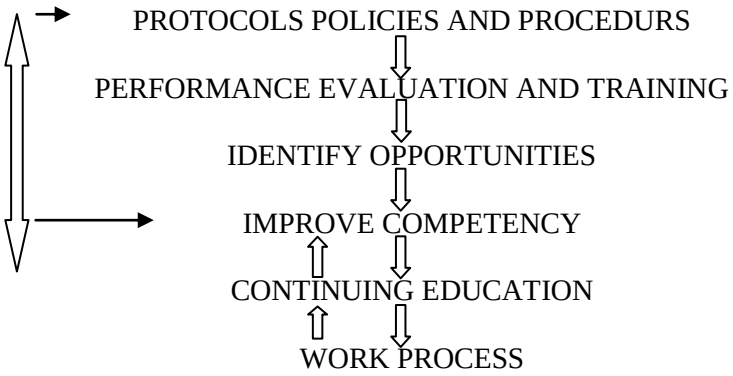

Figure 1: Cycle of Continuous Quality Improvement in Healthcare System

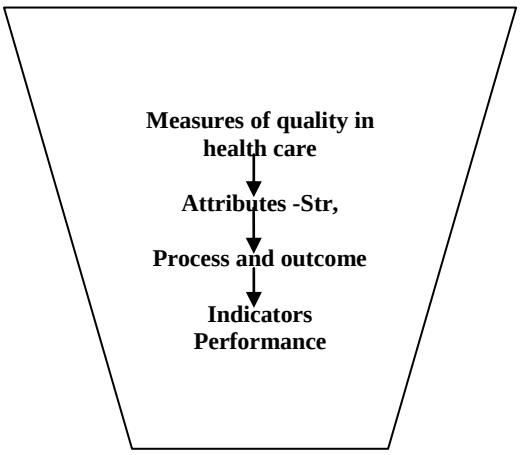

Figure 2: Flow of Quality assessment in Healthcare

The flow of process assessment is shown in the Figure 2 which gives an idea of flow from the measurable attributes to indicators performance. The existing observations are categorized as per the process flow hierarchy. By allowing more data to be exposed in all criteria is helpful in evaluating quality performance. Comparison of overall rating of the mentioned observations was showed in Figure 3 and 50 to 70% score is given to the process completed. This indicates that the workforce has to concentrate more on the work process in order to achieve the 100% score rating. The organizational hierarchy right from top-level management to workforce, through medical director, administrator and clinical coordinator, a positive organizational culture assists, ease of implementation high quality work process is illustrated in Figure 4. There should be simultaneous effective interaction in order to achieve the full competency in healthcare quality system as per the NABH standard.

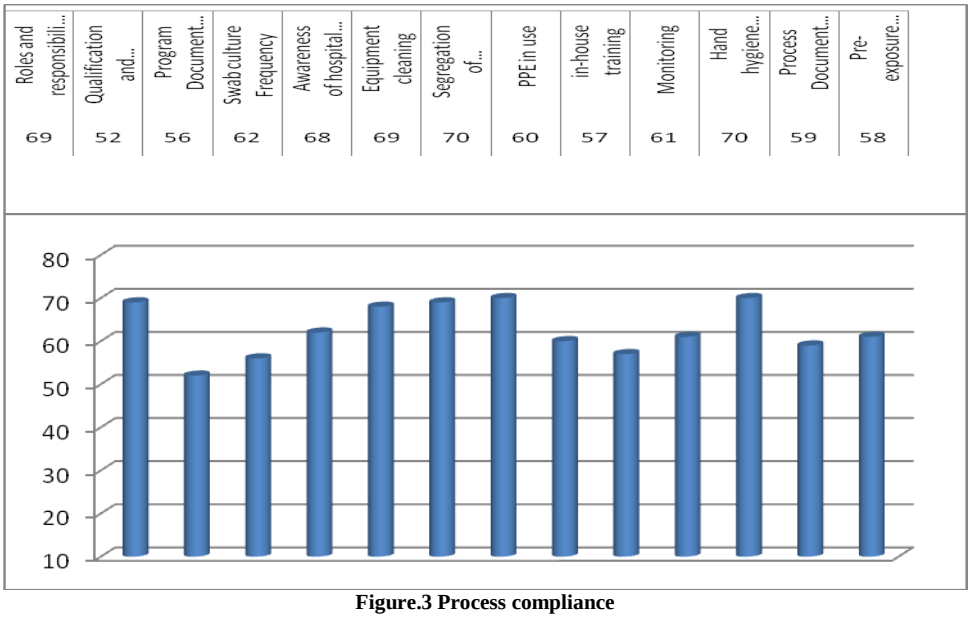

Figure.3 Process compliance

Figure 4: Continuous Quality Improvement Program

Training was given to staff covering theoretical aspects as well as interactive sessions for protocol writing, documentation, equipment cleaning, biological waste segregation, hand hygiene, housekeeping, communication and other department related activities. After the training, compliance to the procedure was monitored during the period of entire study. It was shown that there is a gradual increase in the implementation of practice especially in hand hygiene compliance and proved that effective training outreach is very good. The same is presented Figure.5 to explain increase in compliance trend from July 2015 (73%) to Dec 2015 (86%). This reinstates that appropriate use of guidelines; education and training; auditing and surveillance ensures achieving positive compliance.

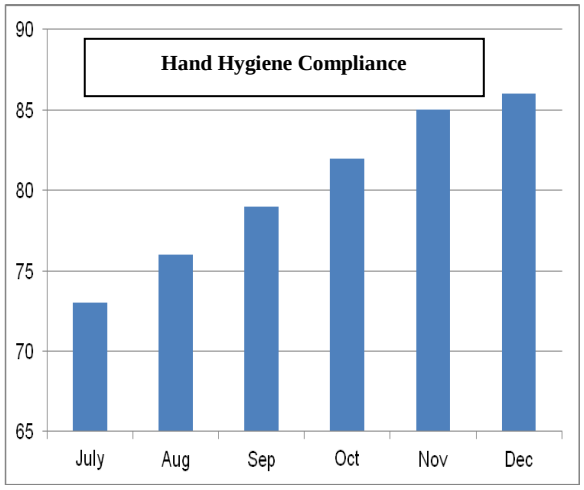

Figure 5: Hand hygiene compliance

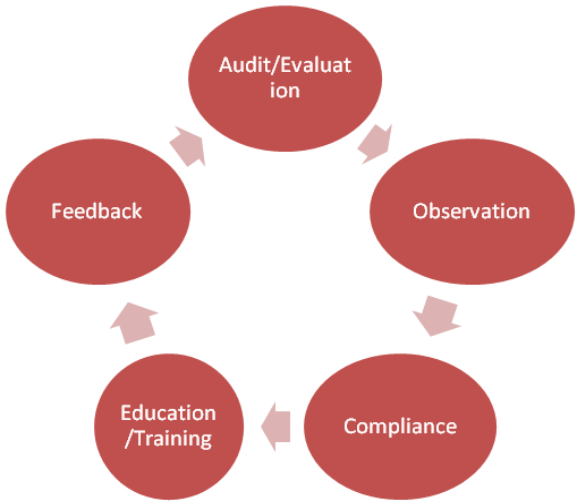

Figure.6. Evaluation chart Quality System Improvement in Healthcare

Figure 7: Environmental hygiene in healthcare

Audit on staff awareness for biomedical waste segregation was conducted among the healthcare workers,

doctors and nurses and allied staff. Audit was conducted to assess the practice of biomedical waste segregation in the wards, laboratories operation theatres, investigation areas, intensive care units and biomedical waste segregation at source jointly by co-coordinator, nurses, and quality management team along with third party assessment team. Re-audit on the mentioned observation was conducted to assess the change in practice after the training sessions and its implementation by in house internal assessment team. Compliance study was done based on quality audit, interview with staff member's quality process and involvement and commitment in terms of work process. Observed structure and process indicators were measured at the time of audit done against the regular assessment of validity of checklists against national guidelines. The level of implementation was rated based on total, high, partial and non compliance. Audit and evaluation, training and feedback are the back bone of quality system improvement as cycle of flow and the same is depicted in the Figure 6.

Figure 7 depicts the compliance percentage demonstrated by staff nurse, technician and healthcare workers, in terms of environmental hygiene. Findings related to surface cleaning 80%, Decontamination of medical equipment and devices 80%, Management of spills 60%, Safe handling of sharps 50%, Safe handling of waste 50% and Safe handling of laundry and linen 65% compliance with environmental hygiene, which indicated that awareness, education and training is needed continuously and the effective monitoring for its proper implementation should assure the quality of environment hygiene in order to reduce HAI related infections.

DISCUSSION

This study was conducted to analyze and evaluate the quality system implementation as per regulatory standards in multispecialty hospitals with respect to structure, process and outcome in relation with hospital associated infections.

Hospital infection rate is the important factor that adversely affects image of the hospital. Hospital acquired infection due to negligence of hospital authorities, doctors and other staff. Hence, it is necessary to take active and effective on-going program of surveillance and quality system implementation link to hospital acquired infections and should be implemented in every hospital. Prime intention is to provide quality care and hygienic atmosphere for patient and protect them from any unavoidable harm.

Infection control program and committees are established in number of hospitals. Hospital infection control committee has representatives from the management, consultant doctors, microbiologist, nursing supervisors, a biomedical engineer, and central sterilization department, and maintenance department. The HIC also have infection control nurse. The quality of a hospital's infection control program is an indication of the standard of care provided by the hospitals applying for accreditation with JCI and NABH. [11]

Laboratory acquired infection is an area of concern for hospital authorities. The important task is to determine which laboratory procedures, or other exposures to infectious agents are the source of laboratory acquired infection. Importance should be given to monitor the various procedures in the laboratory. Hospital authorities should implement infection control program and ensure the safety of the staff and the patients. [12,13] In France, percentage score obtained in HAI shared with publics and is one of the outcome indicators. [14]

To implement quality systems, dept personnel, conduct regular assessment and provide feedback. [15] Hospitals should concentrate on the following aspects to improve healthcare system: (1) deficient infrastructure (2) deficient manpower (3) unmanageable patient load (4) equivocal

quality of services (5) high out of pocket expenditure [16] in line with ensuring clinical quality and safety of patients and visitors. Structural indicators stats the service quality and in turn relates to the patient safety, reduced infection and other emergency services provided. Outcome Indicators are service in time, addressing patient complaints and to increase the hospital image on patient perception.

Structure Indicators

Having night-time intensivist physician staffing in ICU reduces mortality and improved the quality of care. The patient nurse ratio should be maintained 4:1 for non-ventilated patients and 1:1 for ventilated patients in the multispecialty hospital. Kane *et al., 2007* [17] showed, more number of nurses was directly connected to reduce death and any other adverse events. This stressed on the importance of the proper ratio of nurse and patient to minimize the infections in critical care units and to prevent exhausted in turn increase the work efficiency of the nurses in healthcare system. Our study outcome was based on the data collected through discussion with hospital staff and direct observation. There was a full time resident doctor present who attends to the patient needs and the various specialists were informed on call and there is a full time intensivist present in ICU in the hospital.

Educated, skilled man power, protocols and strategies in place have proved as increasing quality of service. [18] The study regarding the care of the patients at the staff in MICU and a satisfaction survey conducted by Ray *et al*., 2009 [19] we understand that patient or patient party is satisfied regarding the ICU including the infrastructure, treatment care and outcome.

Resources and infrastructure facilities along with quality system and comply to the standards certainly stats that quality services provided. Patient satisfaction surveys also play a crucial role in assessing the quality of care. Patient's perceptions of service in time, solving patients query make a good opinion about the particular hospital service. [20] Man power and other facilities should be available in order to support and continue implementation of hospital infection control practices.

Process Indicators

Swab culture in the critical areas, segregation of biological wastes, compliance monitoring in hand hygiene, in house training was found to be lesser in this study, signifying better quality of care.

Health care workers must use soap solutions and wipe with paper towels which helps to arrest outbreaks of *C. difficile* (1B) thus clearly indicates that hand hygiene technique cuts the rate of infection. Use and change of gloves, use of goggles and facemasks are recommended while the process is on. This clearly states that our emphasis on quality system adherence on Hand hygiene implementation proposed better outcomes such as use and change of gloves and compliance to hand hygiene.

Based on the system study observation continuous monitoring of process compliance should be done by infection control team. To reduce infection rate, constant monitoring of adherence to the process is very essential. Methodology of monitoring should be adopted as per the hospital procedures. Surveillance and monitoring of microbes at hospital atmosphere minimize the rate of infection. Hand hygiene practice which controls most of the hospital associate infection. [21] This statement is reinstating the objective of present study quality system adherence to hand hygiene protocol.

Infection control nurse is responsible for training other staff on infection control and prevention; maintain record and monitoring these HAI related activities. [22] Regulations also insist that continuous staff education is necessary. JACHO recommends that Induction training to infection control staff thus makes staff accountable for infection prevention. [23] Infection control nurses are responsible to monitor the process and to assist other staff in documentation.

Implementing infection prevention recommendations directly reduce hospitals' infection rates, and enhance the quality healthcare of patients. Adherence to HAI prevention measures and its success requires the support and involvement from management and its outcome directly related to the quality service and patients safe. [24] Implementing safe disposal of medical wastes and clinical sharps by effective environmental service, prevent health care associated infections, [25] this reinforces quality system implementation in biological waste disposal. Observed good practice of following use of PPE, hand hygiene practice and managing biological wastes among the staff rated their interest in the service quality to the patients. [26] This study again emphasized on study objective to comply quality system.

Thorough environmental hygiene is important to control infectious disease transmission within healthcare settings. Environmental hygiene includes effective cleaning of surfaces using appropriate products, decontamination of medical equipment and devices used in patient-care procedures, safe and appropriate handling of sharps, blood and body fluid spills, waste and linen. Quality indicators related to HAI can be of benefit in assessing valuable organizational infection prevention traits such as resilience, fundamental to the maintenance of services, or sudden and emerging events such as outbreaks.

Outcome Indicators

Regarding patient satisfaction, placing qualified, skilled staff gives better service which makes patients to feel satisfaction. In hospital set up man power ratio should be appropriate to the work load, otherwise it leads to failure in the given service as per JCAHO study. [27] One nurse for eight patients might reduce the costing but it directly relates to the quality of the service provided, these studies further emphasizes better man power ratio to the patients avoid any adverse events and improve the service quality as per the study conducted in US. Madhok et al., 2014 [28] study stats that in India, patient safety and quality improvement are just emphasized in education and training, especially the shortages of trained nurses in quality care.

The outcome indicator creates a path for organizing structure and process in the existing setup and in turn reduces the differences in patient satisfaction. Hospital hierarchy should allow free exchange of information among staff that creates tension free atmosphere in their work place and helps to improve rapport among all levels of staff that in turn leads to increase productivity. [29]

One way is to establish and monitor and evaluate quality system implementation in healthcare setup is to promote employee job satisfaction. [30] Operational processes are reviewed periodically for its accuracy and transparency by practicing quality system. Implementing the quality of care becomes important to the hospital management, since it helps quality improvement by continuous monitoring of quality indicators. [31]

Continuous learning in a good working environment gives confidence to staff in performing clinical processes. It also improves developing a skill in turn provides quality improvement. The majority of staff had interest to participate in specialized training programs to improve their knowledge and implement quality system in healthcare. Quality improvement creates no change in existing quality practice in terms of service delivery. It also enhances staff performance, job satisfaction as well as retention by making them to feel unique. [32] The main limitation is the man power especially in the quality team need to be raised. The frequency of educating and training personnel needs to be augmented. Educating nurses to acquire knowledge and skills required to perform infection control practices and in turn educate other nurses in the hospital which reduce the hospital infection. [33] Similarly monitoring frequency should be increased which brings out continuous quality care and in turn proves that quality system is in place.

Compliance monitoring includes: 1. Quality Policies and procedures; 2. Quality team 3. Training and continuing education; 4. Effective communication; 5. awareness of standards; 6. quality system which monitor and identify non compliance 7. procedures and system for solving non compliance. Management should ensure that the quality team is a part of the organization and have a free hand to monitor operational measures. Leadership can be galvanized by external endorsements. For example, higher level position statements such as the Chennai Declaration stimulated the integration of IPC and antimicrobial stewardship at hospital board level in India. [34]

Effective implementation and complying of infection control measures can control the development of HAIs [35] whereas Non-compliance negatively impacts the acquisition of infections. [36] Thus ensures that implementing infection control measures reduce and prevent HAIs and provides patient safety.

CONCLUSION

A descriptive study was conducted to study the implementation of quality system in hospital with respect to clinical measures such as structure, process and outcome which are considered as clinical indicators to improve quality in healthcare. The study focuses the need to improve the structure indicators namely availability of hospital infection control team, their roles and responsibilities, and the specific training needed for them to be implemented. And storage of hospital wastes, frequency of swab culture, segregation of biological waste, equipment cleaning, use of PPE, monitoring procedure for hand hygiene compliance, verification process for infection risks and its trends, housekeeping service and proper documentation for the mentioned activities needs to be improved. The process indicator needs to have continuous improvement in order to attain the complete quality of care.

Quality in health care has a broad concept which involves monitoring of clinical measures. To have self-improvement each hospital should have strong management commitment for quality health care and its implementation. The efforts taken by the hospital to improve quality directly relates to preventing HAIs.

When the organization follows HIC rules and monitors the implementation by effective implementation of quality system to comply the HIC rules. That will bring a major change in any organization effectively that reduces 0% infection rate in patients and employees.

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