

## Hygiene and health: Effects, experiences, and expertise of “Clean India Campaign” from a tertiary care hospital

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### ABSTRACT

**Background:** The current happenings in the country for the good should be of importance in the crucial places and the critical phases of life, i.e., hospitals and during hospitalization, even for normal life processes. The current “Clean India Campaign” is a catalyst for hospitals for improvements in hygiene. **Objective:** The objective of this study is to define and describe the impact of multifaceted infection control and hygienic practices by all on hospital-acquired infections (HAIs) in the pediatric age group. **Materials and Methods:** Implementation of multifaceted infection control policies was ensured along with the health education for hygienic practices by all, including attendants of patients and patients when possible. These were rigorously enforced with the renewed enthusiasm since the launch of “Clean India Campaign” from January 2015. The setting was “Paediatric Wing” of a tertiary care hospital catering to a large army cantonment, and also, referred cases. The outcome measures were the incidence of HAIs. **Results:** The incidence rate of HAIs was 2.91% (July 2013-December 2014) and declined to 1.59% (January 2015-June 2016) (relative risk: 0.547, 95% confidence interval: 0.409-0.733;  $p=0.0001$ ). The most significant decline in HAI in our study has been in that of gastrointestinal infections (RR: 0.428%, 95% CI: 0.241-0.761;  $p=0.0034$ ). Overall, the results of preventive actions were rewarding (RR: 0.547, 95% CI: 0.409-0.733;  $p=0.0001$ ). **Conclusion:** The mission “Clean India Campaign” and the WHO’s vision “clean care is safer care” lead to prevention and reduction of HAIs. Implementation of multifaceted infection control interventions is impactful. Hygienic practices teaching should be for both caregivers and caretakers.

**Key words:** Children, Hygiene, Hospital-acquired infections, Prevention

Hospitals are important places in the society and should aim at playing an important role in influencing hygienic practices not only by the health-care providers but also the receivers, i.e., the public. Hospitals can contribute constructively in the current “Clean India Campaign.” The costs of hospital-acquired (nosocomial) and other health-care-associated infections are great. Their prevention should be at the forefront. Intriguing and inspiring are the efforts for the control of hospital-acquired infections (HAIs). Several strategies are used. The effect of public attention may be more positive [1]. India has shown significant commitment toward the highest level of hygiene and sanitation [2]. We doctors can play an important and impactful role and should utilize this opportunity to take further our fight against microbes infecting hospitalized patients. Hospitals are where the diseased and the disabled are looked after, and also, the normal life process (i.e., birth) occurs. Care, cure, comfort, and cleanliness should be the motto of all health institutions - treating, training, and teaching.

According to the “UN-water global analysis and assessment of sanitation and drinking-water 2014 report,” only one-fifth of the countries indicate that hygiene plans are implemented, financed, and regularly reviewed. The report terms hygiene promotion as

the critical “H” factor [3]. Effective functioning of health-care settings depends on a number of different requirements, including safe and sufficient water, basic sanitation, adequate management of health-care waste, appropriate knowledge and application of hygiene, and adequate ventilation [4]. An understanding of the situations within countries has been crucial to inform the WHO’s “patient safety program” to support reduction and prevention of health-care-associated infection around the globe [5]. We carried out this study with the philosophy and pragmatism in the spirit “what is measured improves,” [1] and document results of our progressive efforts in our fight against microbes. The objective of the study was to assess the impact of multifaceted infection control and hygienic practices by all on HAIs in pediatric age group.

### MATERIALS AND METHODS

The impact assessment intervention study was conducted in the pediatric wing of a tertiary care service hospital. The hospital caters to a large army cantonment in the central India and also treats patients referred from a large geographic area of the country, predominantly the state of Uttar Pradesh and its neighboring

states. The beds authorized and held are 68, and the bed occupancy rate is 83%. Total number of hospital deliveries is about 1000/year. However, no patient refused health education as they were explained that it is for their good. The HAI incidence reported in the department’s annual reports was examined, and data from July 2013 to December 2014 and January 2015 to June 2016 were compared and analyzed. All patients from 0 to 18 years admitted in the Pediatric Department were studied. Patients whose parents were not willing to participate in the study were excluded from the study.

### Intervention

Implementation of multifaceted infection control policies was ensured along with the health education for hygienic practices by all, including attendants of patients and patients when possible. These were rigorously enforced with renewed enthusiasm since the launch of “Clean India Campaign” from January 2015. The components of the comprehensive strategies used were as follows:

- i. Health education for hygienic practices: This was carried out regularly through lectures and bed-side demonstrations for the staff. For the patients and their attendants, this was through motivational talks in groups and also individually. Deficiencies noted were pointed out along with the corrective measures
- ii. Sanitation: Provision of adequate amount of water and sanitation facilities was ensured. Special emphasis was given on cleanliness. General waste management of the ward was ensured through good administrative support. Biomedical waste management services comprised of segregation, collection, transportation, storage, and disposal as per the Bio Medical Waste Handling Rules
- iii. Hand hygiene: This was ensured by all caregivers. Adequate facilities for hand washing were available, and alcohol-based (hand) rubs were made available at all points of care. The recommendations were washing hands when hands visibly soiled, otherwise use hand rub. Training of all health-care providers was regularly done with the aim to raise awareness, build knowledge, and help to remind about critical issues and ways of focusing on them [6]. Health education of the patients and their attendants for hand washing was carried out. Attendants of patients were explained the benefits of hand hygiene and the risks to health without this, all in simple terms
- iv. Patient placement: This was scientifically carried out to prevent cross-infection. Patients considered being contagious and those at increased risk for acquiring infection were isolated in separate room
- v. Empiric transmission-based precautions: These comprised of contact, droplet, and airborne precautions. These always included standard precautions
- vi. Professional excellence: This was constantly updated and upgraded. This included antibiotic stewardship. These were ensured through regular symposiums, seminars, journal clubs, and updates of postgraduate level, as this is a teaching institution.

### Outcome Measure(s)

Incidence of hospital acquired infections: These were defined as infections acquired during hospitalization. Common sites of these are the respiratory tract, gastrointestinal tract (GIT), bloodstream, skin, and urinary tract [7]. The following criteria were used for these as follows:

- i. Respiratory tract infection (RTI): Clinical presentation of cough/fever/pulmonary infiltrate in any lung location
- ii. GIT infection: Clinical condition presenting with vomiting/ loose stools with or without blood
- iii. Skin infection: Any of these purulent (furuncle/carbuncle/ abscess) or non-purulent (necrotizing infection/cellulitis/ erysipelas)
- iv. Viral rash or exanthems: Onset after hospitalization and beyond the minimum incubation period for the clinical diagnosis
- v. Central venous catheter-related infection: Clinical suspicion on the basis of appearance of the catheter site or the presence of fever or bacteremia without another source and confirmed by culture of the same species of microorganism from peripheral blood cultures and from culture of the vascular catheter tip
- vi. Ventilation-associated pneumonia (VAP): New-onset fever and leukocytosis accompanied by demonstration of an infiltrative process by chest radiography
- vii. Surgical site infections: Infections of the tissues, organs, or spaces exposed by surgeons during the performance of invasive procedure
- viii. Urinary tract infections: Urine culture positive after 2 days of catheterization/following instrumentation.

### Statistics Analysis

Pre- and post-intervention effects were assessed by calculation of relative risk (along with 95% confidence interval [CI]) and p value by Fisher’s exact test - two-tailed using SPSS version 16.0.

### RESULTS

The total number of hospital admissions of children 0-18 years of age was 4018 from July 2013 to December 2014 and 4456 between January 2015 and June 2016. The HAIs types, their incidence, and statistical analysis of results are given in Table 1. HAIs during these periods were 117 (2.91%) and 71 (1.59%). The incidence rate of HAIs reduced from 2.91% to 1.59% (relative risk: 0.547, 95% CI: 0.409-0.733). The breakup of these is depicted graphically in Fig. 1. Overall, the results of preventive actions were rewarding.

### DISCUSSION

There has been an increase in the prevention and control activities in the field of infection control and hospital hygiene in the recent years owing to an increased awareness of the patient safety and the considerable burden of HAIs [8]. In developed countries, HAI

Table 1: HAIs types and incidence

HAI	Number of cases/total number of cases		Relative risk (95% CI)	p value
	July 2013-December 2014 (%)	January 2015-June 2016 (%)		
General ward medical and surgical				
GIT infection	36/3805 (0.9461)	17/4198 (0.4050)	0.428 (0.241-0.761)	0.0034
RTI	27/3805 (0.7095)	13/4198 (0.3097)	0.436 (0.226-0.845)	0.0162
Skin infection	21/3805 (0.552)	15/4198 (0.357)	0.647 (0.334-1.254)	0.2416
Viral rash or exanthems	2/3805 (0.0526)	1/4198 (0.024)	0.453 (0.041-4.996)	0.6075
Intensive care unit				
Central venous access related/ number of patients undergoing this	8/51 (15.686)	6/60 (10)	0.638 (0.237-1.717)	0.4029
Ventilation-associated pneumonia/ number of patients ventilated	9/93 (9.677)	8/112 (7.143)	0.738 (0.297-1.837)	0.6135
General ward surgical				
Surgical site infections/number of operated cases	7/48 (14.583)	5/52 (9.615)	0.659 (0.224-1.939)	0.5441
UTIs/number of patients with catheterization or instrumentation	7/31 (22.580)	6/34 (17.647)	0.782 (0.295-2.074)	0.7588
Overall	117/4018 (2.9119)	71/4456 (1.5934)	0.547 (0.409-0.733)	0.0001
Mortality	2*/4018 (0.0005)	1*/4456 (0.0002)	0.451 (0.041-4.97)	0.6066

\*Cause - Ventilator-associated pneumonia. HAI: Hospital-acquired infections, GIT: Gastrointestinal tract, RTI: Respiratory tract infection, UTI: Urinary tract infection, CI: Confidence interval

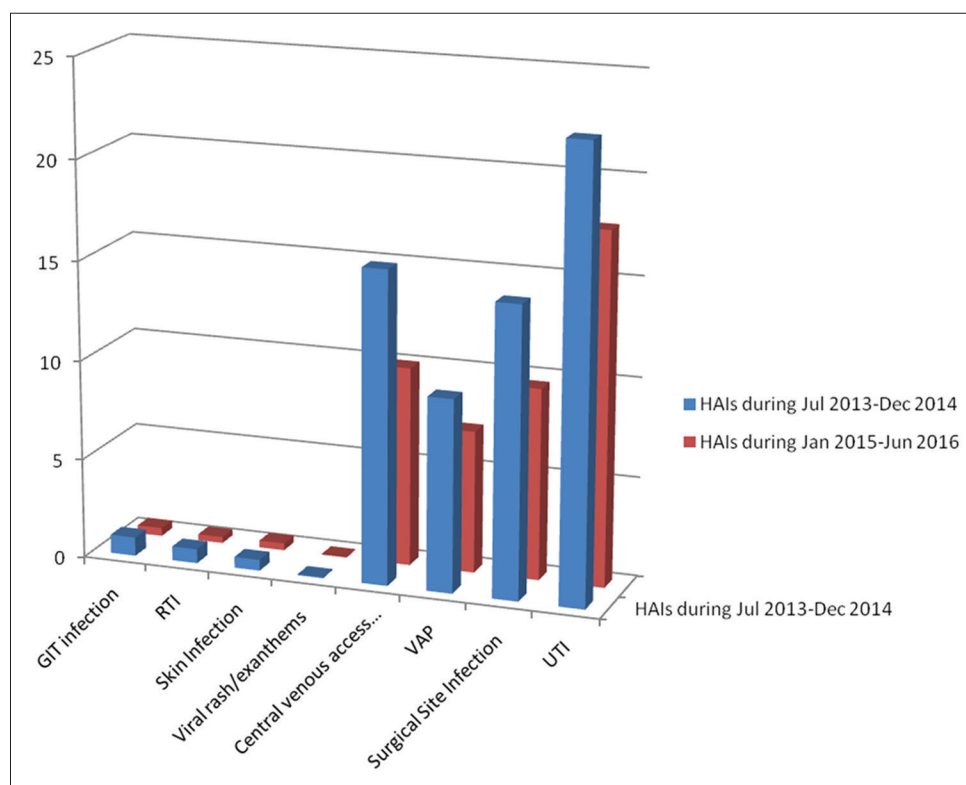


Figure 1: Bar diagram of various types of hospital-acquired infections

rates in infants and children are lower than those reported for the adults and occur mainly in intensive care units; in contrast, in developing countries, pediatric HAI is frequent, and the incidence of infant HAI reaches higher [9,10]. In our country, as children population is large and as they are the vulnerable lot, they definitely deserve not only tender care but also technically correct care with all the tenacious cautions against HAIs. In the US, the national focus on preventing nosocomial infection is emphasized

by the fact that 5 of the 15 elements of the Joint Commission's 2013 National Patient Safety Goals related to reduction and prevention of HAIs. An estimated 3-5% of children admitted to hospitals acquire an HAI [7].

In the study of Puorakbari et al., the incidence of HAIs was 3.34%, and in that of Hamed et al., it was 1.87% [11,12]. Strong conviction with motivation can lead to reduction in HAIs. In our study, the incidence rate of HAIs reduced from 2.91% to 1.59% (RR:

0.547, 95% CI: 0.409-0.733). Murni et al. have recently reported a major reduction in HAIs, from 22.6% (277/1227 patients) in the pre-intervention period to 8.6% (123/1419 patients) in the post-intervention period (RR: 0.38, 95% CI: 0.31-0.46) [13]. This study was in a general public hospital, while ours was at a military public hospital. They implemented multifaceted interventions consisting of a hand hygiene campaign, antibiotic stewardship (using the WHO Pocket Book of Hospital Care for Children guidelines as standards of antibiotic prescribing for community-acquired infections), and other elementary infection control practices. We implemented all these interventions along with health education of attendants and when possible, of the patients. This is important because the two important factors that contribute to HAIs are: (i) Contact with health-care staff and (ii) contact with other patients, and the resultant risk of infections and the antibiotic sensitivity patterns of infective organisms is similar, except for the blood borne infections [14]. Hence, the health education of patients and their attendants is important, which we did. Furthermore, it is wisely said that a picture is worth a thousand words and worthy actions speak louder than words; the photograph of our workplace is given as shown in Fig. 2.

The implementation of multifaceted infection control policies and practices requires constant motivation for strengthening the spirit for sustaining the strategies. The personnel, the persons, and the patients involved are of prime importance for the perfect implementation. Contact precautions besides standard precautions are important. Center for Disease Control designated universal precautions for the prevention of nosocomial infections that are known to have considerable influence [15]. In the previous studies also, nosocomial infections are reported to be reduced by 30% with the implementation of the basic methods of protection from the infection [16,17]. For prevention of respiratory infections, we used the recommended airborne precautions plus contact precautions. For prevention of GIT infections, we used the recommended and logically correct contact precautions [7].

The further back we look up to tracing the origins is important for a firm launch for the future. The engine behind the drive for hospital reform in the mid-19<sup>th</sup> century was Florence Nightingale [18]. It was through her observations that the link between sanitary conditions and healing became recognized and established. After her tremendously successful humanitarian venture at the Scutari Barrack Hospital during the Crimean War, Nightingale was able to convince the world of the necessity of improving hygiene and sanitation as well as having trained professional nurses tending the sick in the hospital wards [18]. Since then, much water has flown down the Thames and Ganges. The administration of the advice of doctors has to be done by the workforce; hence, there is a need for their training and motivation.

The most significant decline in HAI in our study has been in that of GIT infections (RR: 0.428, 95% CI: 0.241-0.761). The impact of decline in GIT infections can have far reaching implications. Globally, mortality from diarrhea may be declining rapidly, but the overall incidence of diarrhea has only declined from 3.4 to approximately 2.9 episodes per child year in the past two decades,



**Figure 2: The ward - “Immaculately clean and shining - for a bright future”**

and it is estimated to account for 23 million childhood disability-adjusted life years [19]. Hence, there lies the importance of cleanliness, hygiene, and health education, and this can usefully add for our unaccomplished aims. With our infection control measures, RTIs declined significantly. Respiratory hygiene and cough etiquette are rewarding. This is of particular importance since RTIs are the leading cause of mortality in children.

In our study, overall, the result of preventive actions was statistically significant, including that for GIT and RTI in the general ward. For other HAIs, the results were not statistically significant; however, the incidence has been low. Besides continuing the strategies that we used, further research is needed to further decrease the incidence of these. The only cause of mortality in our study has been VAP. Although liberation from mechanical ventilation as soon as clinically possible is the most effective strategy, the use of a protocol for oral hygiene/decontamination is a mean of reducing the risk of VAPs [20]. Sound clinical practice guidelines and recommendations can have resounding success when they are refined and refreshingly implemented.

Research shows that when patients are engaged in their health care, it can lead to measurable improvements in the safety and quality [21], and the Indian army has orders on the subject [22]. The strengths of our study are systematic implementation and also involvement of patients and their caregivers, all with results. The limitation of our study was that it was done in a highly disciplined setting of an Armed Forces Hospital, making generalization for all hospitals not exactly possible, but definitely, it can be a source of inspiration. On the basis of our study results and experience gained, future planning for action needs to be suggested. As a part of a drive to place clean care at the heart of infection control and patient safety, the WHO’s major strategies for the implementation of “Clean Care is Safer Care” include (i) raising awareness globally of the impact of HAIs on the patient safety and promoting preventive strategies and (ii) inviting ministers of health from all WHO Member States to make a formal statement committing to address health-care-associated infection in their country [23].

For our ministries and hospitals, the pertinent and progressive actions for the hospital hygiene, which can raise awareness and rhetorically address the issue for results, can be summarized as ABCDE plan, as follows:

- Avenues and attitudes: Identification of problematic areas and orientation in attitudes of the workforce
- Betterment and beautification: Building on strengths and beautification for ubiquitous success
- Comprehensive with conviction: All aspects need to be considered involving everyone with conviction to act and achieve
- Diligence for making a difference: Meticulous efforts for scrupulous results
- Energized for excellence: It requires sustained energy leading to excellence, to achieve the targets, and to stay high on the results.

Among physicians, there is a growing sense of the responsibility as teachers of better habits of life and work, and hospitals in like manner are becoming more truly educational centers in preventive medicine [24]. Over the past 100 years, both man and microbes have evolved. In our fight against microbes, this is increasingly becoming important.

## CONCLUSION

Multifaceted infection control interventions are effective in reducing HAI rates. Health education of the caregivers and caretakers reduces HAIs, and the health benefits are likely to continue. Experience, whether good or bad, of being ill and doing everything not to fall ill, is the best teacher, and the best teaching tact with impact is when one is ill. High standards of cleanliness in health-care facilities also serve to promote the observance of such practices among the general public.

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