

Using behavioural change as a tool to reduce healthcare associated infections in a low resource setting

Namita Jaggi, Pushpa Sissodia

Artemis Health Institute, Sector 51, Gurgaon, Haryana-122001, India

doi: 10.3396/IJIC.v10i4.027.14

Abstract

Infection Prevention is an old science but a new art. The reasons for non-compliance to infection control practices in healthcare settings are related to psychological barriers, preconceived notions, cultural influences and ineffective time and resource management. Can we use behavioural change as a powerful tool to improve infection control practices and reduce healthcare associated infections (HAI)? This study was carried out for one year from July 2012 to June 2013. Twenty four healthcare practitioners (nurses) were identified. A baseline assessment of their awareness and compliance in infection prevention was undertaken followed by a behavioural training imparted by a psychologist who then addressed the issues. A post training assessment was conducted and results statistically analyzed. Results showed that 19 of the 24 (79%) showed significant improvement ($p < 0.05$) in all aspects of competency in infection prevention. A positive correlation was observed between the compliance to infection control practices and decrease in HAI. In conclusion, understanding human behaviour leading to low compliance to infection control practices and imparting training to overcome these blocks can be a powerful, cost effective and a rational approach to reduce HAI in low resource settings.

Keywords: Patient care team and education; Quality improvement; Cross infection and prevention and control; Attitude of health personnel

Corresponding Author

Dr. Namita Jaggi

Director, Labs & Infection Control

Artemis Health Institute, Sector 51, Gurgaon, Haryana-122001, India

Email: namita@artemishealthsciences.com

Introduction

Health-care associated infections (HAIs) and increasing antimicrobial resistance (AMR) are growing global concerns which impact patient care, patient safety and ultimately the quality of care.¹ Development of an effective infection prevention and control (IPC) program with a focus on standardized protocols and continuing staff education does help in the reduction of these infections.² However, a review of evidence has concluded that well documented guidelines and policies have not always translated into best practices.³⁻⁵ Compliance to IPC precautions and hand hygiene is internationally suboptimal.⁶ Even though the healthcare workers know and understand the institutional policies, social, cultural and environmental factors affect their behaviour which in turn affects the translation of these policies into practice.⁷

This has so far not been effectively addressed and it is important that interventions which bring about changes in behaviour are adopted and utilized in healthcare settings. A wide range of behaviour change models have been developed and adapted for use in programs which have involved studying the components of the behaviour system that are required to bring about an effective change.⁸

To assess, formulate and apply behavioural change as a tool to reduce HAI in a low resource setting, we designed a one year study in an Indian tertiary intensive care unit (ICU). The main objectives of the study were to evaluate the perceptions, attitude and mindset of nurses, to identify the important barriers preventing adoption of IPC practices, to impart specific behavioural training focusing on removing those barriers and ultimately creating a culture of safety within the organization. The post training improvements in hand hygiene and IPC protocols compliance were measured and correlated with the HAI rates.

Methods

Setting

This cross-sectional study was undertaken between July 2012 and June 2013 in 4 ICUs [MSICU1 (Medical Surgical ICU)-36 Beds, MSICU2-20 Beds, PICU (Paediatric ICU)-12 beds and NICU (Neonatal ICU)-10 beds] of a tertiary care hospital setting in India.

Design:

The study was divided into the following stages (Fig 1):

1. Stage I (July-Sep 2012)- Selection of participants: 47 nurses with more than 5 years of experience were randomly selected by draw of lots by ICU Head and were subjected to answer a questionnaire which covered questions related to knowledge about infection control measures namely hand hygiene and prevention of specific device associated infections (catheter associated urinary tract infection [CAUTI], central line associated blood stream infections [CLABSI] and ventilator associated pneumonia [VAP]). There were 20 questions carrying 2 marks each. The nurses were selected on the ability to score at least 50% marks. There were 24 such nurses selected.
2. Stage II (October-December 2012)- IPC practice measurement: All the selected (24) nurses were then observed for adherence to hand hygiene and compliance to an infection control (IC) check list for device associated infections. The hand hygiene compliance was measured by the infection control nurses (ICN) as per the WHO⁹ recommended method. These ICNs were trained suitably about the Infection control practices by the Infection Control Officer (ICO) followed by a competency test. The Hand hygiene and checklist compliance collected by ICNs was suitably corroborated, checked and validated by the ICO. The IC checklist focused on 5 critical selected parameters for prevention of each of the specific device associated infections with 1 point awarded for compliance to each critical component. The hand hygiene and IC checklist compliance percentages of the respondents were then averaged (mean) and recorded.

The percentage compliance was calculated in both these sections as follows:

Hand Hygiene Compliance (%):

$\frac{\text{Total no. of Hand Hygiene actions} \times 100}{\text{Total no. of Hand Hygiene opportunities}}$

IC Checklist Compliance (%):

$\frac{\text{No. of IC measures adhered to} \times 100}{\text{Total no. of IC measures recommended}}$

3. Stage III (January-March 2013)- Behavioural assessment and Training: The selected candidates were subsequently subjected to a Behavioural Assessment Scale (BAS) where a 5-point Likert

scale (1= Strongly agree, 2= Agree, 3= neither agree nor disagree, 4= disagree and 5=Strongly disagree) was applied on 25 questions to analyze the perceptions, attitude and mindset of nurses

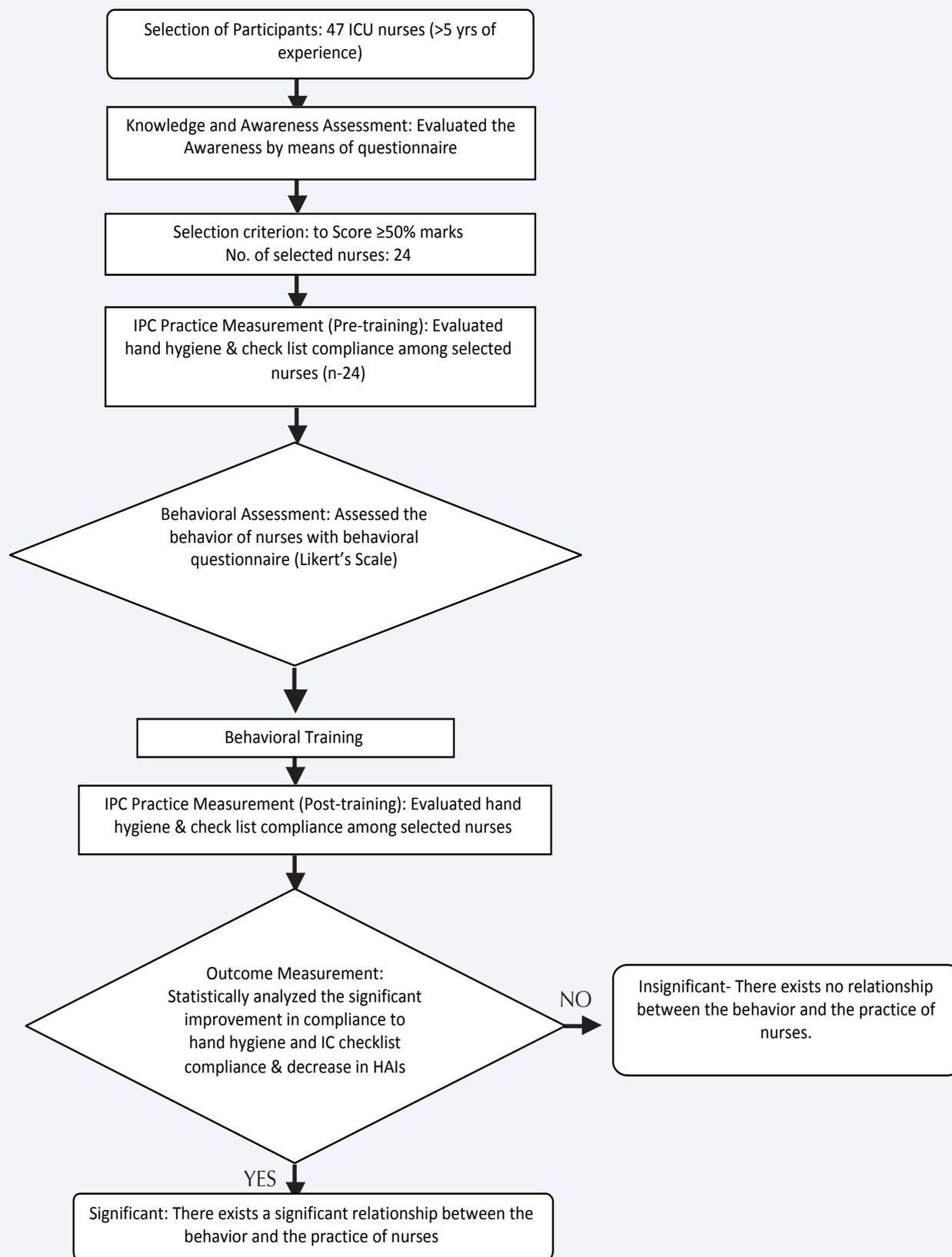


Figure 1. Process Flow of the study

towards IPC. The 5 most common barriers were listed by picking up what most respondents ticked as agree or strongly agree. Post behavioural assessment, specific training targeted to overcome the 5 identified stumbling blocks was provided by a trained psychologist.

4. Stage IV (April-June 2013)- IPC practice measurement: The effect of behavioural training in removal of the stumbling blocks was assessed by subjecting the 24 nurses to observation of compliance to hand hygiene and IC checklist again.
5. Outcome measurement: The pre- and post-training hand hygiene and IC checklist compliance and the HAIs were compared, analyzed and correlated for the entire study period. The HAI surveillance protocols and guidelines for all the four infections like CAUTI, CLABSI, VAP and surgical site infection (SSI) were based on the CDC recommendations. HAI surveillance was performed by the ICNs as part of their routine work which involved collection, analysis and reporting of data on healthcare associated infections. The suspected HAIs were then confirmed and validated after discussion with the treating clinician and the ICO.

6. Data analysis: Statistical analysis was performed by SPSS-20.0 software. A paired sample t-test was performed on the compliance to hand hygiene and IC checklist and HAI rates for pre- and post-behavioural training periods. A p-value of <0.05 [at 95% confidence interval] was considered significant.

Results

A total of 24 out of 47 (51%) nurses with an experience of 5 years or more in the ICU were selected for the study by means of a baseline assessment of their knowledge and awareness of hand hygiene and specific device associated infections.

IPC practice measurement-Pre training

During the IPC measurement in the pre-training period, the mean hand hygiene compliance of the 24 nurses ranged from 30% to 55%, the mean being 40%. The IC checklist compliance of the respondents varied between 25% and 63% averaging to 46.8% (Table I).

Behavioural Assessment

Utilizing the Likert's scale to assess the perceptions, attitudes and mindset of the 24 respondents, the most common barriers contributing to decreased compliance identified were confusion in ownership

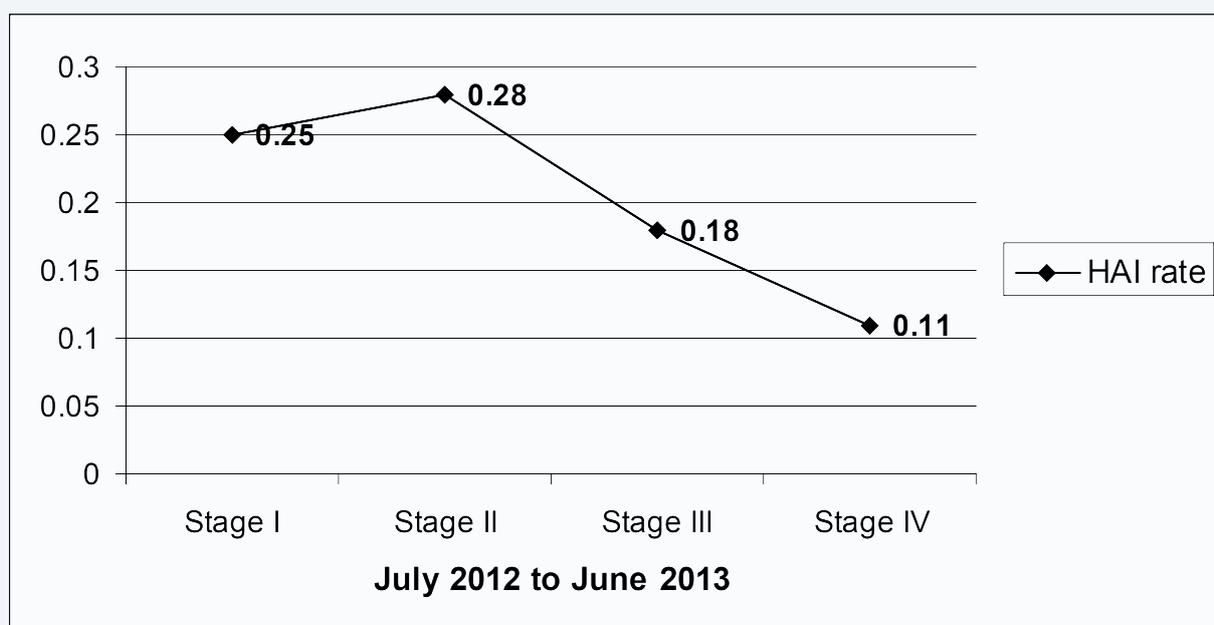


Figure 2. Trends of HAI rate from July 2012 to June 2013

Stage I- July-September 2012

Stage II- October-December 2012

Stage III- January-March 2013

Stage IV- April-June 2013

Table I. Average Percentage Compliance (Hand Hygiene & Infection Control Checklist) for Pre- and Post-training Periods

S.No.	Hand Hygiene Compliance		Infection Control Checklist Compliance	
	Pre-Training (%)	Post-Training (%)	Pre-Training (%)	Post-Training* (%)
1	35	55	25	30
2	41	63	60	51
3	38	78	55	65
4	39	67	42	61
5	31	58	35	54
6	37	55	57	51
7	36	51	38	43
8	33	49	63	47
9	32	57	48	52
10	30	59	45	61
11	32	64	47	55
12	38	61	39	40
13	47	68	61	63
14	43	61	53	55
15	55	55	57	56
16	52	53	48	53
17	44	69	61	52
18	45	75	45	63
19	42	71	47	51
20	47	59	37	41
21	39	61	33	52
22	41	53	53	54
23	35	65	35	41
24	47	68	39	60
Mean	40.0	61.5	46.8	52.1

* Shaded boxes indicate the nurses who did not improve significantly after training

and accountability in prevention of HAI, lack of effective role models, perceived importance of IPC and the will to allot time to it, lack of repeated training and inadequate organizational encouragement and support. The training imparted to these nurses was focused to improve upon these behavioural stumbling blocks. This was done by targeting their mindsets and preconceived notions about taking up a responsibility as a frontline healthcare provider in preventing the patient from getting infected through a probable breach in IPC practices rather than emphasizing on teaching the set policies and protocols which they already knew.

IPC practice measurement-Post training

The hand hygiene compliance percentage of the nurses improved to 61.4% in this period (range- 49% to 78%). This was a significant increase of 53.5% (from 40% in pre-training to 61.4% in the post training period, $p < 0.001$). The mean IC checklist compliance percentage post-training increased to 52% (range 30% to 65%). There was an 11.1% increase (from 46.8% in pre-training to 52.0% in post training, $p = 0.015$) in IC checklist compliance in the post training period which was significant. However, when the individual compliance results were assessed, it was found that only 79% (19 out of 24) of nurses have shown significant improvement in all aspects of competency in IPC. The remaining 21% (5 out of 24) improved in hand hygiene but not in the IC checklist compliance.

Outcome measurement

The analysis of the HAI data for the given study period (July 2012-June 2013) was done in all the four stages (I-IV). A decline (Fig 2) was observed in HAI rates from stage III (behavioural training period) and continued thereafter. The HAI rates of first two quarters (pre-behavioural training, mean-0.27) were compared to last two quarters (post-behavioural training, mean-0.14) and the difference was found significant ($p = 0.010$) with an overall reduction of 60.7%.

Discussion

Infection prevention is an old science but a new art. Among the cornerstones of IPC, hand hygiene is the most important. The introduction of many initiatives and formulation of effective guidelines and standardized protocols have been developed in

this field. Although knowledge and belief about the importance of infection control practices is high in some areas for preventing the HAIs, there is much room for improvement in the actual practices. This requires effective methods to change the behaviour of health care workers (HCWs) towards IPC practices to reduce HAIs and improve patients' safety, an area which is currently understudied. Among the HCWs, since nurses play a frontline role in prevention of infection, they become an important population to focus the study on.¹⁰

Our survey of the knowledge and awareness assessment reported that there exists incongruence between the knowledge about the IPC protocols and their actual practice in the nursing staff. This survey showed that all the selected nurses (24) were aware of the hand hygiene and IPC protocols. The level of awareness of these selected nurses was in the range of 50% to 95%. However, the practice measurement reported that mean compliance to hand hygiene and IC checklist among nurses was only 40% and 46.8% respectively. Similar results have been reported by HICPAC in the past.¹¹ Several other studies have reported low levels of compliance in spite of standardized protocols and guidelines.¹²⁻¹⁴ This showed that although the participants had adequate knowledge and awareness of the guidelines, protocols and their importance in reduction of HAIs, the reported implementation of the same was low. The reason for low compliance to IPC practices in healthcare settings are related to psychological barriers, pre-conceived notions, cultural influences and ineffective time and resource management.¹⁵⁻¹⁸

In this study, we made an attempt to assess the psychological barriers among the nurses which may be responsible for the incongruence between and practice towards IPC by utilizing the behavioural assessment scale (BAS). The five common stumbling blocks identified by this were confusion of ownership and accountability, lack of effective role models, perceived importance of IPC and the will to allot time to it, lack of repeated training and inadequate organizational encouragement and support. Various studies carried out in this regard have reported inadequate facilities,¹⁹ lack of effective communication or knowledge,^{15,20} and time²⁰ as perceived barriers to optimal hand hygiene practices. The five barriers identified in this study were

given emphasis and training imparted to the staff as an effort to remove them. A post behavioural training assessment of the IPC practices followed.

The post-training practice measurement reported a significant increase in the hand hygiene (53.5%) and IPC practices (11.1%) of the nurses. Several studies have reported similar results and it indicates that to bring a change in an individual's behaviour and practice one needs to target his mindset and perceptions.^{21,22} Several such behavioural interventions grounded on psychological frameworks were implemented in community settings and have proved successful.¹

Another important finding reported in the study was that the overall improvement of the nurses post-behavioural training was significant but did not approach 100% as there were 79% (19 out of 24) of the nurses who improved overall and rest 21% (5 out of 24) showed improvement in hand hygiene but not in IC checklist compliance. This indicated that though as a group, they showed an increase in compliance, it was not 100% and 5 out of 24 respondents had not favourably responded to group behavioural therapy. Therefore, sometimes, individual perceptions and mindsets have to be worked upon in a one to one interaction.

The outcome measurement of the study reported that the effect of the behavioural intervention was positive in bringing about a decrease in HAI rates by 60.7% in the post-training period. This could be attributed to the significant increase in hand hygiene compliance (53.3%) and IC checklist compliance (11.1%) in this period.

The limitations of this study were that it was confined to the ICU and was carried out for a brief period of one year. Also, there could be more depth in the behavioural assessment to uncover other contributing factors to non-compliance. Furthermore, through this attempt we studied the first layer of the obvious behavioural attitudes of the healthcare practitioners (nurses). We intend to take this study forward in detail.

In conclusion, the present study highlights that understanding human behaviour leading to low compliance to IPC practices and imparting training to overcome these stumbling blocks can be a powerful,

cost effective and rational approach to reduce HAIs in low resource settings which eventually creates a culture of safety within the organization.

Acknowledgement

We owe our great thanks to Artemis Health Institute for extending their kind support and encouraging us in pursuing this study. The only source of funding for the present study was Artemis Health Institute. No external grants or funds have been obtained for the study.

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