International Journal Dental and Medical Sciences Research
Volume 3, Issue 6, Nov-Dec 2021 pp 493-502 www.ijdmsrjournal.com ISSN: 2582-6018

Hand Hygiene Compliance Analysis and Improvementin a Tertiary Care Hospital

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Submitted: 06-12-2021 Revised: 18-12-2021 Accepted: 21-12-2021

ABSTRACT:
Introduction- Healthcare associated infections (HAIs) are a cause of high morbidity, disability and reduced quality of life, as well as mortality and rising costs for health systems. Preventing the HAI risk by planning and implementing effective preventive strategies is important to safeguard patient health.
Material & Methods- The study was an observational, cross-sectional one. Hand hygiene compliance was monitored using the hand hygiene observation tool developed by the WHO. A non identified observer was used for monitoring compliance with hand hygiene. The observational period was over 365 days period from November 2020 to October 2021. Gaps were identified, root cause analysis done and cause specific interventions implemented.
Results- After a period of 365 days it was analysed and found that there were significant improvement in compliance rates following appropriate interventions.
Conclusion- It was concluded that serious efforts are needed to improve the hand hygiene practices among the healthcare workers.

KEYWORDS: Hand hygiene, healthcare associated infections, hand washing, IPSG 5.

I. INTRODUCTION

[1] Healthcare associated infections (HAIs) are caused by environmental pathogens or patient's endogenous flora. HAIs are related to both pathogens and host characteristics. Virulence, infectious load, and multiple resistances against antibiotics are the aspects related to the pathogen. The factors associated with the host characteristics include age, chronic diseases, iatrogenic or pathological immunosuppression. Furthermore, the use of invasive diagnostic and therapeutic procedures is an additionalrisk factors contributing to HAIs. Health care workers (HCWs) hands are the more frequent carriers for the responsible microorganisms. For these reasons,infections are often associated to inadequate hand hygiene practices among health care workers and poor clinical conditions during hospitalization.

[2] Indications for hand hygiene (WHO)

A. Wash hands with soap and water when visibly dirty or visibly soiled with blood or other body fluids (IB) or after using the toilet (II).
B. If exposure to potential spore-forming pathogens is strongly suspected or proven, including outbreaks of Clostridium difficile, hand washing with soap and water is the preferred means (IB).
C. Use an alcohol-based handrub as the preferred means for routine hand antisepsis in all other clinical situations described in items D(a) to D(f) listed below, if hands are not visibly soiled (IA). If alcohol-based handrub is not obtainable, wash hands with soap and water (IB)
D. Perform hand hygiene: a. before and after touching the patient (IB); b. before handling an invasive device for patient care, regardless of whether or not gloves are used (IB); c. after contact with body fluids or excretions, mucous membranes, non-intact skin, or wound dressings (IA); d. if moving from a contaminated body site to another body site during care of the same patient (IB); e. after contact with inanimate surfaces and objects (includingmedical equipment) in the immediate vicinity of the patient (IB); f. after removing sterile (II) or non-sterile gloves (IB).
E. Before handling medication or preparing food perform hand hygiene using an alcohol-based handrub or wash hands with either plain or antimicrobial soap and water (IB).
F. Soap and alcohol-based handrub should not be used concomitantly (II).

[3,4]It has been postulated that if adequate hand hygiene protocols are strictly followed by healthcare personnel, it could lead to a significant 15–30% reduction in hospital acquired infection; however, observational studies show that hand

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hygiene compliance rates are about 50% of opportunities in hospitals.

[5] There are varying reports on the rates of contamination of the hand of healthcare workers. Some studies report rates as high as 10–78% among health practitioners with Staphylococcus aureus the predominant organism implicated.

[6]Contamination of hands by other pathogens in the healthcare environment includes vancomycin-resistant enterococci, Clostridium difficile, and Enterobactereaceae, and some of these organisms persist on the hands for several weeks after colonization**.**

[7]Healthcare-associated infections (HCAIs) have an excellent impact on morbidity, length of hospital stays, and treatment prices. [8] Health care providers' hands are the main usual mode of the vehicle for the transmission of HCAIs. About 50% of HCAIs happens due to the hand of health care providers.

[9, 10] The WHO in 2004, approved the creation of an "Alliance for Patient Safety", which acknowledged the universal need to improve hand hygiene in healthcare institutions, developing a strategy with a very clear call to action: "Clear hands are safer hands". These globally approved recommendations reinforce the need for multidisciplinary interventions, including important elements such as education and motivation on healthcare workers, the inclusion of alcohol-based solutions, the use of compliance indicators and a strong commitment by all healthcare managers.

II. MATERIAL AND METHODS

The study was an observational, cross-sectional study. Hand hygiene compliance was monitored using the hand hygiene observation tool developed by the WHO. A non identified observer was used for monitoring compliance with hand hygiene. The observational period was over a 365-day period from November 2020 to October 2021. Data fromthe survey conducted with asample size of 6446 was collated and enteredinacomputerbasedspreadsheet,recoded and analyzed using Microsoft Office Excel2013and descriptivestatistics.

All categories of staff maintaining close contact with the patients were included in this observational study. Special consideration was given to the technicians, phlebotomists and physiotherapists as these were the few neglected group who worked in close proximity to the patients coming into contact with blood and body fluids but at the same time being careless with the routine infection control practices followed by other staff. The study noted down the day to day gaps in the hand hygiene compliance process. A thorough root cause analysis was done after which probable, proximate and systemic causes for the same were outlined. Leadership and infection control meetings were conducted and brainstorming done. A definite solution was devised in each cause identified and reinforced among the healthcare practitioners. A definite timeline was given for the action taken assigned to aspecific managerial staff. A plan of action was formulated and implemented.

Data was analysed, mean and one standard deviation was calculated and compared across the months before and after interventions. Control charts were formulated depicting the mean, upper control limit, lower control limit and the benchmark. The resulting trend line showed the one year trend for the same.

The lowest compliance rate (against a benchmark of 100%) for technicians was in the month of February and April when the percentage dipped to 96% (216 instances of compliance out of 227 observations in February and 237 out of 246 observations in April 2021), mean being around 96.33 and standard deviation of 0.77. For physiotherapists, the lowest compliance rate was 90% in the months of April and May (9 instances of compliance out of 10), yearly mean being around 91.33% with a standard deviation of 1.43. Lowest compliance rate for Phlebotomists was 90% in the month of May (9 compliances out of 10 observations) yearly mean being around 92.66 with a standard deviation of 2.53.

Causes for decreased compliance:

Technicians

Probable Causes	Proximate Causes	Systemic Causes	Probable Solutions

Hand Hygiene not practiced after patient contact	-Lack of awareness & reluctance. -Hand rub not available at bed side -Hand washing basin was far from bedside	-Inadequate training on Hand hygiene Guidelines -Delay in receiving Indent -Alternative product not available	-Training for the staff -Follow up of indents -Availability of Hand rubs
Lack of awareness	-Staff not attending classes -reluctant to learn -shift timings do not match -lack of supervision	-not convinced by the floor supervisors -Non-compliance mostly in morning shifts -Supervisors busy with other activities	Counseling of staff needs to be done. -shifting be done in appropriate way. -supervision needed at all times.
Distraction during the course of hand hygiene	-work load -multiple consultants visits at the same time -call from another patient	-multi dimensions of work in the critical care units. -rush of instructions at the same time -multiple allocation of patients	- Organizing the workflow to prevent overload -consultant round to be attended by the seniors along with the staff -organization of work
Forgetting in the course of work	-Emergency situation -too busy with work -indent not placed for hand rub	-patient had sudden drop of heart rates -engaged with immediate emergency with the patient -hand rub was over and staff did not find time for indent	-reminders by peers to do hand hygiene -help to be provided by co-workers during busy moments -dedicated person ensure hand rubs are with the patients

Physiotherapy

Probable Causes	**Proximate Causes**	**Systemic Causes**	**Probable Solutions**
Reluctant to go for hand washing	-hesitant in using product Product perceived as unpleasant - Frequent movement in and out of patients rooms	-Skin irritation related to products -do not like the odor of the product -Multiple procedures for the patient	-provide an alternate product - Counseling needed for the perception. - Planning of workflow needed
Lack of awareness	-not attending classes. -reluctant to learn. -shift timings do not match -lack of supervision	-not convinced by the floor supervisors -mostly in morning shifts. -Supervisors busy with other activities	-Counseling of staff needs to be done. -shifting be done in appropriate way. -supervision needed at all times.

7 steps of Hand Hygiene not followed	-Not aware of 7 steps. -Lack of Practice of Hand washing -Lack of Close monitoring & supervision -Lack of ongoing regular training -Reluctant and careless staff	-Improper & irregular Training -Lack of Accountability of oneself -Monitoring done in irregular frequency -Hand hygiene poster not present	- CME organized and staff participation was encouraged -Monitoring done in regular frequency -Hand hygiene posters to be displayed in all units

Phlebotomy

Probable Causes	Proximate Causes	Systemic Causes	Probable Solutions
Hand rub not used in between patients	-hand rub not placed near patient -did not ask the staff for hand rub	-delay in indent to arrive -staff busy to place near patient -staff preoccupied to observe the compliance of another staff	-immediate indents to be raised. -placement of hand rubs to be done immediately. -supervision and monitoring to be done round the clock
Does not have time to do hand washing	-Too busy attending other calls -lack of education -reluctant to reach up to hand rub	-lack of other staff to attend the calls -unaware of the policy on hand washing -hand rub placed near the trolley	-organizing the work and arrangements of manpower to be done
Wearing of gloves interferes with the process	-not in the practice to do hand washing. -perceives hand hygiene consumes a lot of time	-Lack of training -lack of understanding regarding the same.	Training and counseling regarding the hand hygiene to be reinforced
Lack of accountability	-no over site over the staff -lack of time. -lack of habit -lack of reminders from peers	-all staff engaged with their work -multiple call for blood withdrawal. -no supervision present	-Counseling of staff regarding organization of work to be emphasized - Supervision to be done senior s present in the unit
Lack of awareness	-not attending classes. -reluctant to learn. -shift timings do not match -lack of supervision	-not convinced by the floor supervisors -mostly in morning shifts. -Supervisors busy with other activities	Counseling of staff needs to be done. -shifting be done in appropriate way. - Supervision needed.

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Actions taken:

1. Handrub placement at all strategic areas in the hospital
2. Supervision and monitoring by seniors and the Infection control team around the clock
3. Organising work and solving manpower related issues so that stress on other staff minimizes
4. Training and regular counselling of the staff periodically
5. Staff working in flexible shifts to prevent work fatigue
6. Indents organised and regular followup done
7. Assistance and hand holding by seniors during busy work hours
8. Regular vigilance by the housekeeping supervisors to check availability and use of handrubs
9. Proper treatment and assistance of staff if allergic reaction occurs due to use of handrubs and replacement by better skin friendly products
10. Hand hygiene posters and videos available at all areas in the hospital to provide a visual aid to augment proper use and technique
11. Mystery observations were continued during this period and data was continuously collected.

III. RESULTS

The compliance rates improved after monitoring, vigilance and interventions.

The compliance rates for technicians increased to 97% and 98% in September and October 2021 respectively (296 instances of compliance out of 305 observations in September and 294 out of 300 observations in October 2021), yearly mean being around 97.08 and standard deviation of 0.66. For physiotherapists, the compliance rate increased to 100% in the months of September and October with 14 compliances among the 14 staff observed, yearly mean being around 93.33% with a standard deviation of 3.28. Compliance rate for Phlebotomists was 100% in August and 94% in September and October (11 compliances out of 11 observations in August, 13 out of 14 observations in September and 15 out of 16 observations in October) yearly mean being around 93.66 with a standard deviation of 3.22.

A remarkable increase was seen in the compliance rates of physiotherapist and phlebotomists to achieve the benchmark of 100% in the following months after proper implementation and supervision. Slight increase was noted in the compliance rates of technicians, probable reasons being as they work in high dependency and intensive care units, increased workload and stress being few of the contributing factors. Others may include the reluctant attitude of the staff or even carelessness and tendency to hurry in order to complete task at hand.

It was also seen that the increased compliance corresponded with decrease in the hospital acquired infections rate, reduction in average length of stay and a smooth, seamless delivery of care.

Constant supervision and motivation is required for the staff instead of blaming or victimising them. Non Compliance might be a result of multiple systemic factors involved and hence our Training and development department makes it a point for regular staff trainings.

CONTROL CHARTS

The control charts below depict the hand hygiene compliance rates from November 2020-October 2021 for technicians, physiotherapists and phlebotomists. The trend line is plotted against the mean, upper control limit and lower control limit and a definite improvement in the trend line is seen in the later part of the year after interventions.

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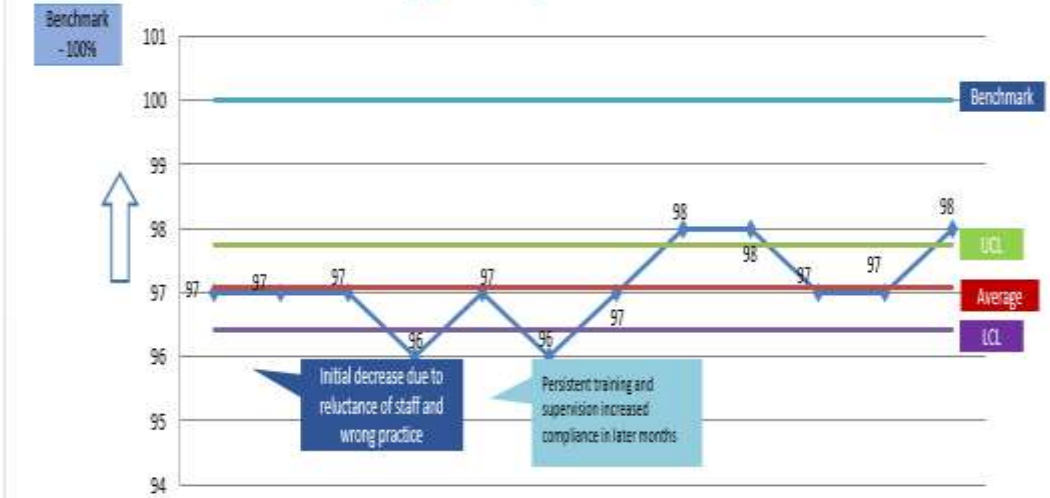
The Control Chart

Source- WHO

Benchmark - 100%



	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21
Percentage	97	97	97	96	97	96	97	98	98	97	97	98
Average	97.08	97.08	97.08	97.08	97.08	97.08	97.08	97.08	97.08	97.08	97.08	97.08
UCL	97.75	97.75	97.75	97.75	97.75	97.75	97.75	97.75	97.75	97.75	97.75	97.75
LCL	96.41	96.41	96.41	96.41	96.41	96.41	96.41	96.41	96.41	96.41	96.41	96.41
Benchmark	100	100	100	100	100	100	100	100	100	100	100	100

Month	Nov 2020	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	June 2021	July 2021	August 2021	September 2021	Oct 2021
Numerator	190	194	212	216	223	237	259	268	281	281	296	294
Denominator	196	200	220	227	230	246	267	275	286	290	305	300

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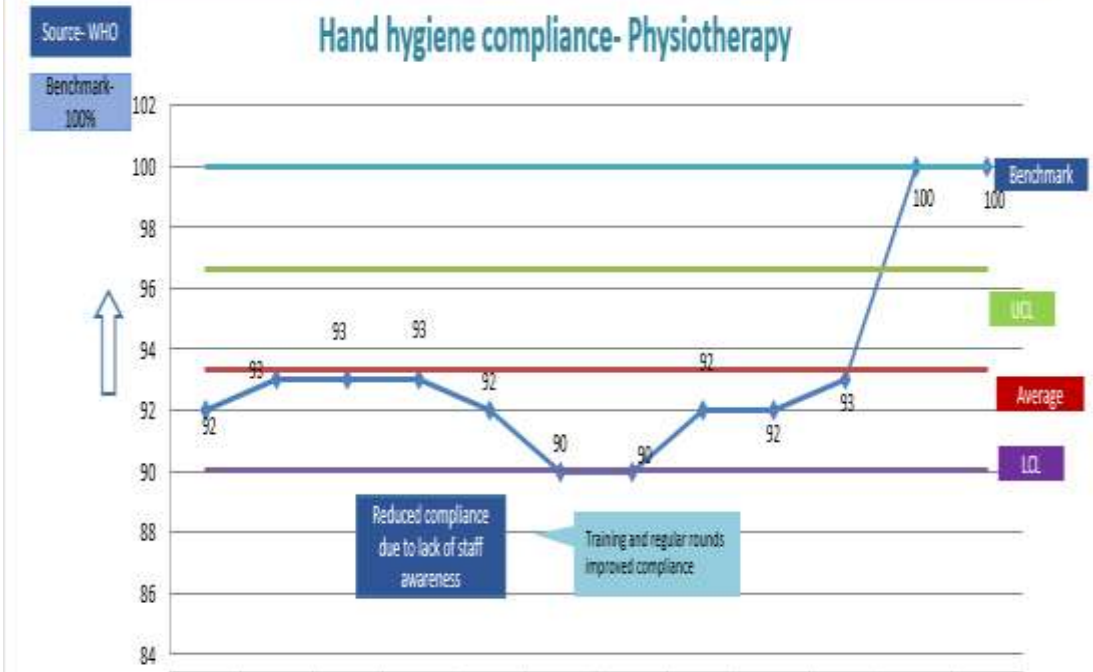
The Control Chart



	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21
Percentage	92	93	93	93	92	90	90	92	92	93	100	100
Average	93.33	93.33	93.33	93.33	93.33	93.33	93.33	93.33	93.33	93.33	93.33	93.33
UCL	96.61	96.61	96.61	96.61	96.61	96.61	96.61	96.61	96.61	96.61	96.61	96.61
LCL	90.04	90.04	90.04	90.04	90.04	90.04	90.04	90.04	90.04	90.04	90.04	90.04
Benchmark	100	100	100	100	100	100	100	100	100	100	100	100

Month	Nov 2020	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	June 2021	July 2021	Aug 2021	Sept 2021	Oct 2021
Numerator	11	13	13	11	11	9	9	12	11	13	14	14
Denominator	12	14	14	12	12	10	10	13	12	14	14	14

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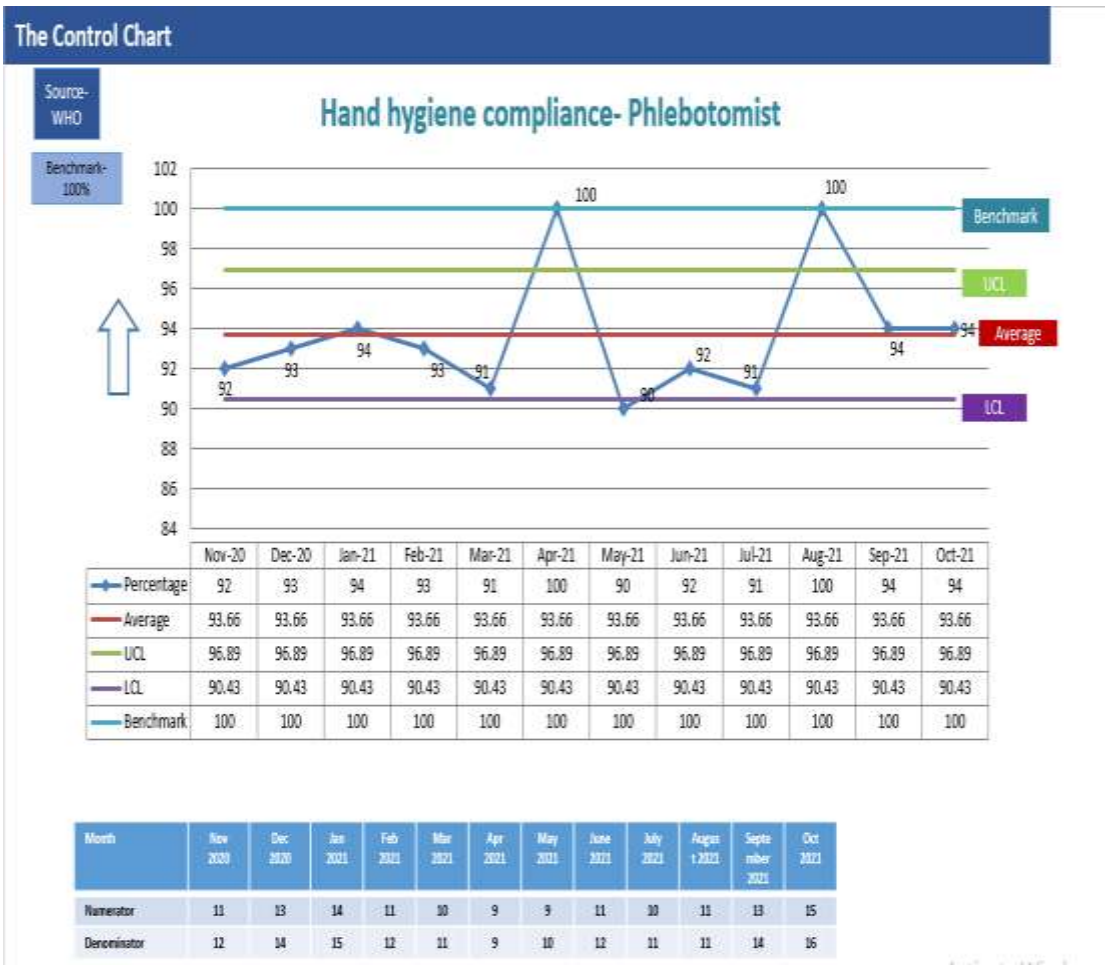
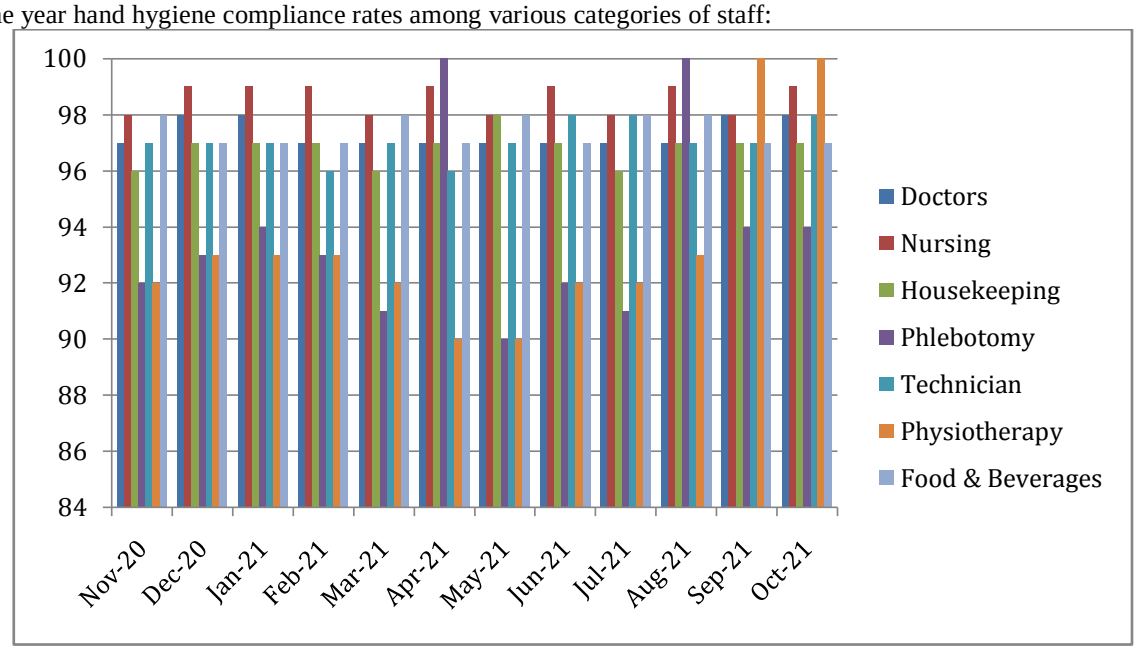


	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21
Percentage	92	93	94	93	91	100	90	92	91	100	94	94
Average	93.66	93.66	93.66	93.66	93.66	93.66	93.66	93.66	93.66	93.66	93.66	93.66
UCL	96.89	96.89	96.89	96.89	96.89	96.89	96.89	96.89	96.89	96.89	96.89	96.89
LCL	90.43	90.43	90.43	90.43	90.43	90.43	90.43	90.43	90.43	90.43	90.43	90.43
Benchmark	100	100	100	100	100	100	100	100	100	100	100	100

Month	Nov 2020	Dec 2020	Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	June 2021	July 2021	August 2021	September 2021	Oct 2021
Numerator	11	13	14	11	10	9	9	11	10	11	13	15
Denominator	12	14	15	12	11	9	10	12	11	11	14	16

One year hand hygiene compliance rates among various categories of staff:



IV. CONCLUSION

Hand hygiene is the basic step to prevent numerable hospital acquired infections and resultant morbidity and mortality among hospitalised patients. Meticulous planning, observation, interventions, guidance and supervision to the healthcare workers helped curb the incidences of the diseases and increase complianceto a great extent.

V. DISCUSSION

[11] One of the reasons microbes have survived in nature is probably their simplicity: a simple genomic framework with genetic encryption of basic survival strategies. To tackle these microbes, human beings will have to follow basic and simple protocols of infection prevention. The health care practitioners in our country need to brace themselves to inculcate the simple, basic and effective practice of hand hygiene in their daily patient care activities and serve as a role model for future generations of doctors, nurses and paramedical personnel.

[12] Poor hand hygiene compliance of health care providers and its healthcare-associated infections have a greater impact on the patients in health care settings. Improvement strategies of poor hand hygiene compliance among health care providers by ensuring that the necessary infrastructure and products are in place to allow hand hygiene performance at the point of care. This includes access to a safe, continuous water supply and the availability of soap and disposable towels, availability of effective and well-tolerated alcohol-based hand rub products at the point of care.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interests regarding the publication of this paper.

ACKNOWLEDGEMENT

We acknowledge the leadership and management at Apollo Multispeciality Hospitals Kolkata due to their kind help and support throughout the process and ensuring the availability of all the required resources at all times.

We also thank the Infection Control Nurses at Apollo Multispeciality Hospitals Kolkata for their help in observing, collecting data, on spot training and being an active part of the project.

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