

Summer Training at



Surat

From 10th May,2021 to 3rd July,2021

A Report Prepared By

Dr. Shaily Modi

Roll No. 1191

Hospital Mentor
Dr. Sanjana Desai
(Manager Clinical Applications)

Faculty Mentor
Dr. J. P. Singh

MBA Hospital and Health Management
2020-2022



Institute of Health Management Research, Jaipur

Preface

IIHMR University, Jaipur gave me an opportunity to do Summer Internship at Shalby Multi-speciality Hospital, Surat. This is very crucial for an MBA student to learn the process of hospital and to conduct case-study based on his/her efficiency and effectiveness of current process which can help the student to develop analytical skills and to evaluate the current process by providing conclusion in terms of recommendation and suggestion, which shows how the student has understood the particular process, which is ultimately going to help him/her in future. This project will be considered as the first step in the practical world as the student is solely responsible for preparing and executing the entire project by his own, and it will help him/her at the time of joining any organization after the completion of this course, because during this summer-internship, the student has come across various departments, and its functioning and also gathered valuable knowledge regarding hospital policies and procedures. The basic objective of the summer internship project is to learn the process of particular organization thoroughly and to develop various analytical skills, which is an essential step towards a successful manager.

This summer training gave me a great opportunity to build up the basic concept of hospital working ethics. As of now, I am very much aware of the real work flow at Shalby Hospitals, Surat.

Acknowledgement

I strongly believe that the contribution and efforts of a single person would not be sufficient to complete this significant proportion of work; overall success of this work depends upon all those people who have contributed in their different way towards the fulfilment of this project on its broader aspect. This Summer Internship project remains incomplete without mentioning the names of whom who has given tremendous guidance & knowledge, due to which I have been polished throughout the time period of this project. I am highly indebted to the management of Shalby Hospital, Surat for providing necessary support and guidance.

This summer training project was short of experiential learning for me which gave me an insights into the day-to-day managerial level problems of this well-known hospital. I consider myself fortunate enough to communicate with the highest authorities and the staff of this hospital, whose throughout support and guidance has helped me a lot towards the accomplishment of this project.

I am highly grateful to Dr. Virendra Chauhan, COO and Dr. Dushyant Patel, DY. CAO of Shalby Hospital, Surat for giving me this opportunity to carry out my summer internship at Shalby Hospital, Surat.

I would like to express my deepest gratitude towards my respected mentor at Shalby Hospital, Surat, Dr. Sanjana Desai, Clinical Applications Manager, for providing her constant support and guiding me throughout my internship tenure and I would like to appreciate her for never denying me to indulge in any short of activity, training or any kind of celebration whatever is ongoing into the hospital, rather she encouraged me to participate in it.

I am highly thankful to my mentor Dr. J. P. Singh from IIHMR University, Jaipur for his constant guidance and valuable inputs and suggestions towards the successful completion of my project.

I would also like to appreciate and thank all those who have directly or indirectly supported and guided me towards the completion of this summer training.

Dr. Shaily Modi

Student of IIHMR University

Batch HM-25

(2020-2022)

TO WHOMSOEVER IT MAY CONCERN

Ref. No: SHACD/IN21-22/353

Date: 05.07.2021

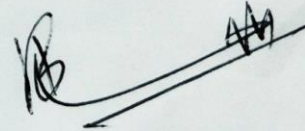
This is to certify that **Dr. Shaily Modi** has undergone an Internship in the
“**Department of Clinical Operations**” from 10th May 2021 to 3rd July 2021 at
Shalby Hospitals, Surat.

During this period she exhibited a high level of professionalism and a
tremendous zest for learning.

We would like to thank her sincere efforts during Covide-19 Period.

We wish **Dr. Shaily Modi** all the best in her future endeavors.

With Best wishes,



Babu Thomas

(Chief Human Resource Officer)



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Abbreviations

BMW	: Bio Medical Waste
CVP	: Central Venous Pressure
DR Server	: Disaster Recovery Server
ER	: Emergency Room
HCO	: Health Care Organization
HCW	: Health Care Worker
ICN	: Infection Control Nurse
IPD	: In-Patient Department
ICN	: Infection Control Nurse
IV	: Intra-Venous
L & D	: Learning & Development
MRD	: Medical Record Department
OPD	: Out-Patient Department
OR	: Operating Room
PIC	: Peripheral Intravenous Catheter
PPE	: Personal Protective Equipment
SHS	: Shalby Hospital Surat

Chapter 1 Observational Learning

CH-1.1 Introduction

THE SHALBY HOSPITALS

Shalby Hospitals was established by Dr. Vikram I. Shah in 1994 in Ahmedabad, Gujarat, runs a chain of multispecialty hospitals in all over India, having bed capacity of over 2000 hospital beds approximately. Shalby's identification as a multispecialty tertiary hospital chain within the Indian healthcare field was a dream of its founder Dr. Vikram Shah.

Shalby has four distinct multispecialty hospitals in Ahmedabad itself, which are situated at Ghuma, S.G. Road, Naroda, Vijay Cross Roads, and Bopal; which shows the popularity and 'healthcare at doorstep' philosophy.

Other working units of this organization are- Shalby Surat, Shalby Jabalpur, Shalby Vapi, Shalby Indore, Shalby Jaipur, Zynova Shalby Mumbai, and Shalby Mohali.

Shalby is also attached with the community by its OPD Centres located all over India and Kenya, Tanzania, and Uganda within the African continents.

SHALBY MULTISPECIALITY HOSPITAL, SURAT

Shalby multi-specialty hospital, Surat was set up in March 2017. It is located Nr. Navyug College, Rander Road, Adajan, Surat.

With a bed capacity of 243 at Shalby Multispeciality Hospital Surat, gives tertiary care facilities having Medical and Surgical ICUs, Labour Room, Modular Operation Theatres with Laminar flow, Nursery, C-ARMs, Cardiac Cath Lab, Carl Zeiss Neurosurgery Microscope, Digital X-Ray, CT, Sonography, MRI, Dialysis, in house Pathology, Laparoscope, Endoscope, Colonoscope, Ventilators, ECHO, TMT, EMG, EEG, NCV, PFT, Uroflowmetry, OPG, Audiometer, pharmacy, 24 Hour Emergency services, and the advanced Ambulances having a facility of mini-ICU in it. The hospital has a dedicated team of Consultants and Super Specialists providing medical care par metro cities. This team consults the patient at the hospital and give multidisciplinary care to complicated cases. Surat Unit of Shalby Hospital is the First Hospital in South Gujarat to start the most advanced Thulium Laser for minimally invasive Prostate and Stone Surgery. Shalby Hospitals, Surat has been accredited by the National Accreditation Board for Hospitals and Healthcare Providers (NABH) for quality in health care and its excellence and also its pathology laboratory has been accredited by the distinguished National Accreditation Board for Testing and Calibration Laboratories (NABL), due to top quality testing and diagnostics capabilities of the hospital. (hospitals, n.d.)

VISION

Exceeding expectation from health.

MISSION

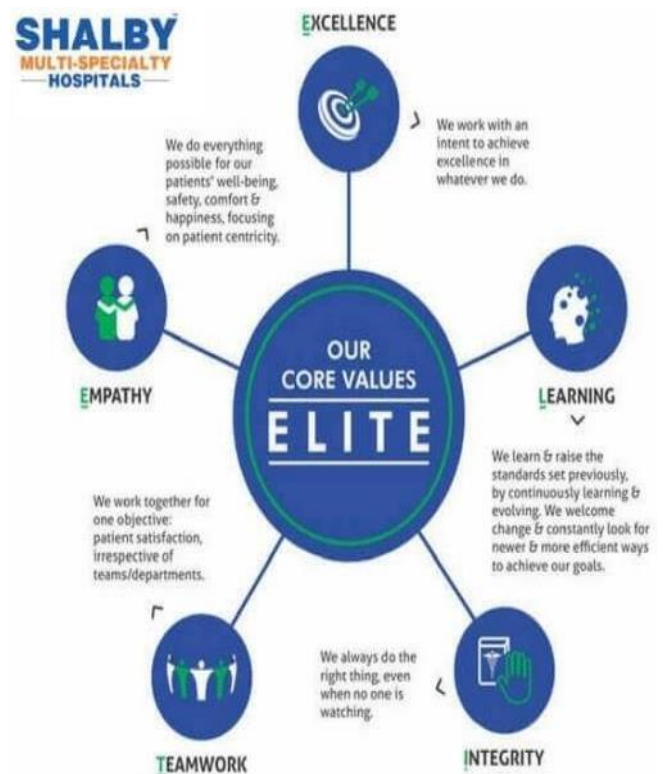
“Leveraging global leadership in Joint replacement to establish multi-specialty care across geographies.”

VALUES

“Value each and every human life placed in our hands and constantly work towards meeting the expectations of our customers and stakeholders by raising the standards of our service deliveries every time.”

At Shalby Hospitals, “we are committed to ELITE.” is their slogan.

- ✚ Shalby Hospitals is committed to excellence and quality with an established focus on the well-being of patients. They provide the right mix of cutting-edge technology, warmth, and compassionate care. Backed by the best team of medical professionals and procedures, they offer the best in private healthcare in a cost-effective way.
- ✚ They provide the highest standard of clinical skills and nursing care across an extensive range of specialties and attract doctors and surgeons from leading hospitals.
- ✚ Delivering an array of medical services, they offer in-patient, out-patient, day care treatment, surgery, emergency, and trauma care in the finest surroundings. What's more, these services can be provided as a part of patient's own private health insurance scheme or self-finance.
- ✚ They believe that focusing on the comfort of their patients helps in their recovery.
- ✚ They cater to individual tastes and requirements to ensure that patients feel as relaxed and comfortable as possible during their stay.



SALIENT FEATURES

-  More than 40 clinical specialties under one roof
-  NABH accreditation for hospitals
-  NABL accredited Pathology Laboratory
-  More than 50 beds for ICU

DESIGN OF THE HOSPITAL

The structure of the hospital contains 9 floors and 1 basement. There are mainly two main entrances, one is for Emergency Entrance and second one is used for COVID admission, which was previously used as General entry. As per infrastructure point of view, the building is like a single tower. Shalby Hospitals, Surat is a 243 bedded multi-specialty medical institution spanning 9 floors and 1 basement.

Floor	Services
9	Cafeteria & Kitchen, Dialysis Centre, Clinical Research, NICU
8	Pathology Laboratory, IT Department, Auditorium, Administrative Department
7	Premium Ward
6	COVID ward
5	COVID ward
4	Twin Sharing & Economy ward
3	CSSD, AHU Area, COVID ICU
2	Operation Theatre, OT Pharmacy, ICU, Cath Lab
1	OPD (Chambers 1-25), Radiology Department (CT, MRI, ECHO, TMT)
G	Reception, Admission-Billing, TPA, OP Pharmacy, Emergency Department, Maa-card/Ayushman, X-ray Department, Ultra-sonography Room, Dental OPD, Biomedical waste storage area, Oxygen gas plant, Electric Panel Room, Underground Water Storage Area
B1	Physiotherapy Department, IP Pharmacy, MRD, General Store, Linen Room, Biomedical Maintenance Store, Staff Changing Room, Mortuary Room, Parking Area, Fire Plant

CH-1.2 Mode of data Collection

- ❖ Data was collected by **Observation and Communication** with the incharges of respected department.

CH-1.3 Observations and Key Learnings

- ❖ Functioning & indicators of each department
- ❖ Work role of different staff at different departments
- ❖ NABH submission process
- ❖ Indent Procedure
- ❖ Role of different committees
- ❖ Paperwork and registers to be maintained by different departments
- ❖ Types of management committees
- ❖ Our Outsourced Services
- ❖ Donning & Doffing steps to be followed
- ❖ Purpose to conduct different trainings
- ❖ Designations based on Organogram
- ❖ Type of inputs can be given by quality manager
- ❖ Type of consent forms
- ❖ Role of Clinical manager
- ❖ Importance of regular rounds
- ❖ Process and importance of Incidence Reporting Form
- ❖ Importance of swab collection from each department on regular intervals
- ❖ Importance of conducting an Audit & its write-up

CH-1.4 Conclusive Learning

Limitations

- ❖ It was observed that HOD of the laboratory cannot directly send the lab reports to the respected persons, as direct e-mail facility is not provided to them.
- ❖ As microbiology and histopathology reports are being outsourced, waiting time is longer than usual to get the results.
- ❖ Users were not raising ticket to get IT support, so it was difficult for an IT person to work officially and un-officially at the same time.
- ❖ Separate patient room was being used for handwashing, refreshing and for keeping all housekeeping materials.
- ❖ Size of dustbin was too small that it has to get empty very frequently, so that attendant was occupied in that process in most of the time.

- ❖ In economy wards, patients have to keep their belongings into main refrigerator, which was kept in main lobby, so it was difficult to manage multiple patients at a time.
- ❖ Due to lack of nursing supervisor in the nightshift, it is difficult to manage the patient flow in the night.
- ❖ Medicines cannot be traced by its content, which is the most common aspect of which most of the staff aware of.
- ❖ It is difficult to manage heavy patient flow in OPD.
- ❖ No solution if 2 patient IDs are created with same details.
- ❖ Manual writing of patient details consumes a lot of time at OPD.
- ❖ Due to lack of medical transcriptionist, radiology coordinator have to handle all the paperwork as well as all the procedures of the department.
- ❖ Absence of scanning machine at MRD.

Suggestions for Improvement

Laboratory :

- ❖ Microbiology & Histopathology setup can be developed at the hospital as special room is there to start these services. Currently, these testing processes are taking place from outsource facilities. So, these testing procedure can be started at the hospital and samples can also be collected from other organizations as per requirement. So, it will also help the hospital to compensate the setup cost.

IT Department :

- ❖ IT room setup is required, as it was not maintained properly. We can keep a rack inside server room to keep material in a proper way.
- ❖ We can create a partition between IT server rack and IT desk to maintain the temperature.
- ❖ DR server should be kept at a separate safe place, as it is a data backup device of all Shalby Hospitals.
- ❖ User has to raise a ticket for getting IT support.
- ❖ Every user in each department has to make sure that before they leave their workplace for a longer period of time like going for lunch or dinner, their system should be properly log off and then power supply should be switched off.
- ❖ Back area of server rack should be covered as multiple cables are open.
- ❖ They should have access card system for entry into IT server Room for the security purpose.

IPD :

- ❖ Blood bank setup can be developed in the hospital, as it is outsourced, for the ease of blood transfusion process during each surgery.
- ❖ Separate handwashing facility should be provided.

- ❖ Proper management is required for BMW. (Size of dustbin)
- ❖ Separate restroom should be there for staff.
- ❖ There should be separate storeroom and house-keeping room.
- ❖ Refrigerator should be bigger in size and multiple units should be kept, as multiple patients admitted are there.
- ❖ Proper medicine tray facility should be provided for the ease of delivering medicines to the multiple patients at a time.
- ❖ 24*7 pharmacy should be there outside IP department, as its difficult to arrange medicines in nightshifts.
- ❖ One nursing supervisor should be kept in nightshift.
- ❖ For Indent facility, medicines are only being traced by its brand name, it should be traced by its content, so each staff can easily access this facility.

OPD :

- ❖ Token system can be implemented to manage the patient flow.
- ❖ One guide can be assigned to the patient, to make a patient familiar with the hospital and who can guide the patient throughout their hospital visit.
- ❖ Separate unit of Help desk, Billing desk and Patient registration desk can be created to manage heavy patient flow.
- ❖ Manual writing of patient details consumes a lot of time, which can be avoided through the use of smart cards/ Labels.
- ❖ Better Scanners can be installed to save the time.
- ❖ Patient waiting area in OPD can be made more aesthetic appeasing and can be equipped with newspaper and magazines to avoid patient boredom.
- ❖ Unpaid/Paid Wi-Fi services can be provided & Hand sanitizers can be installed.

Radiology :

- ❖ Separate reception desk can be prepared.
- ❖ 2 or 3 attendants can be hired for the ease of testing procedure.
- ❖ Separate Staff nurse can be hired.
- ❖ Medical Transcriptionist should be there.
- ❖ Ensuring safety precautions of attendants while attending patients.
- ❖ Training of housekeeping staff to handle COVID patients.
- ❖ Ensuring no delay in TAT.

MRD :

- ❖ 2 persons can be kept :
 1. For data entry of all hospital records
 2. For data analysis from entered data
- ❖ Better Scanners can be installed to save the time.

IP Pharmacy :

- ❖ 1 housekeeping staff and 1 employee are required to fulfill the heavy indent demand from different departments.
- ❖ Refrigerator in bigger size should be there to manage the drug access to be kept at low temperature.

Supply Chain and Procurement Department (General Store) :

- ❖ Date-wise record of discussion with each party for each equipment should be maintained to track any discussion on any particular equipment on any particular date would be easier for assistant staff as well. So, even assistant staff can remind the incharge on the updates on specific orders or they can track the status of that particular order in the absence of their incharge.

Chapter 2 Project Report

CH-2.1 Phlebitis Case-study

CH-2.1.1 Introduction

In majority of the cases which reports to hospital, medical care physicians are the primary responders. One commonly performed procedure in hospital is placement of PIC. Incidence rate of IV catheter placement in a patients admitted to the hospital is almost 80%. (Mandal, 30 Sep. 2019) PIC are most often used for the administration of intravenous fluids, administration of medicines, blood sampling and blood products.

Apart from advantages, PIC insertion is also correlated with some side effects. Phlebitis is the most common side effect related to PIC insertion; its reported cases varies from 23% to 57%. (Mandal, 30 Sep. 2019) Phlebitis causes patient discomfort and frequent change of catheters, as well as it also develops additional complications such as DVT, cellulitis, septicaemia, and will lead to increase the patient stay in the hospital and ultimately it will lead to increase the cost of healthcare.

There are mainly four groups in which **the Factors that leads to the development of phlebitis** are divided. (1) mechanical factors like size, material, and duration of cannulation; (2) chemical factors like drugs and fluids used through that cannula; (3) patient factors like sex, age and (4) practices performed at healthcare setups. (Mandal, 30 Sep. 2019)

Definition

Phlebitis: Phlebitis is an inflammation of the wall of vessels, and it leads to develop localized pain, edema, redness, and palpable venous cord.

PIC: Peripheral Intravenous Catheter is a thin flexible tube that is to be inserted into the vein, which is used for therapeutic purposes like administration of medicines, fluids or blood products also to collect the blood sample. (NCI, 2016)

Problem statement

In the month of December-2020, it was observed that the number of patients, with more than 1 PIC insertion was on an increased side, and staff was not aware about phlebitis identification clinically, which resulted in to delayed presentation.

Aim

To study the number of phlebitis incidents following the use of PIC at Shalby Hospital Surat

Objectives of the study

- ✓ To estimate the number of phlebitis cases in the hospital in all the cases occurring within the hospital.
- ✓ To identify the factors that leads to the development of IV related Phlebitis and associated complications with the occurrence of phlebitis cases.
- ✓ To examine the relationship between occurrence of phlebitis and the length of stay of a patient.

CH-2.1.2 Methodology

Study Type : Retrospective Cohort Study

Study Design : Correlational research design

Mode of data Collection : Internal source of the organization (Secondary data)

Sample Size : 449 Patients who were admitted in the hospital during the period from January 2021 to March 2021 (84 patients have developed phlebitis Out of 449)

Sampling Technique : Purposive Sampling Technique

Analysis Used for data collection : Cross tabulation method was implemented to summarize the data and to see the relationship between variables and the results have been expressed in terms of per cent. Qualitative data has been analyzed using content analysis.

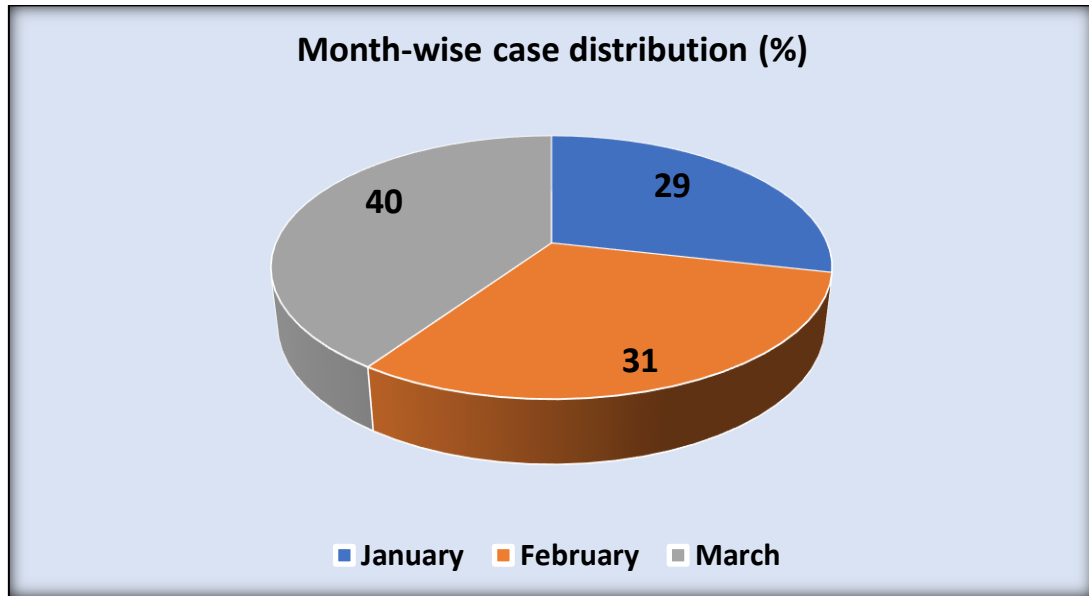
Sample Duration : Jan 2021 to March 2021

Study tool : Visual Infusion Phlebitis scale (Given below in the annexure)

Checklist 1

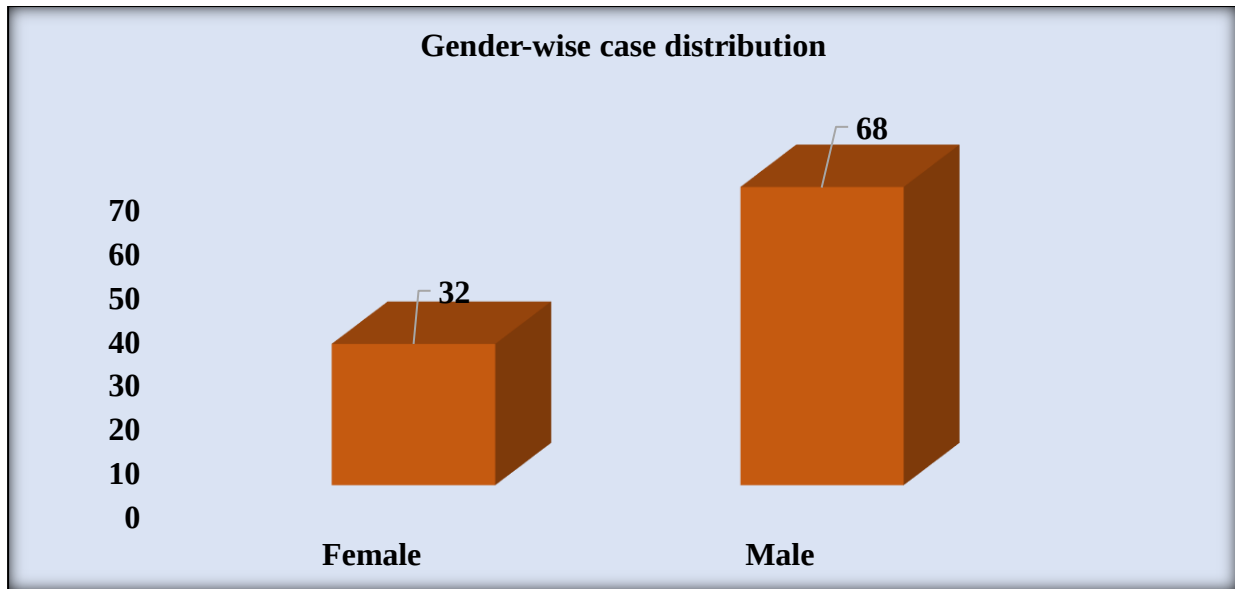
(Findings were categorized into Phlebitis stages based on Visual Infusion Phlebitis Scale)

CH-2.1.3 Data Analysis

*Figure 1*

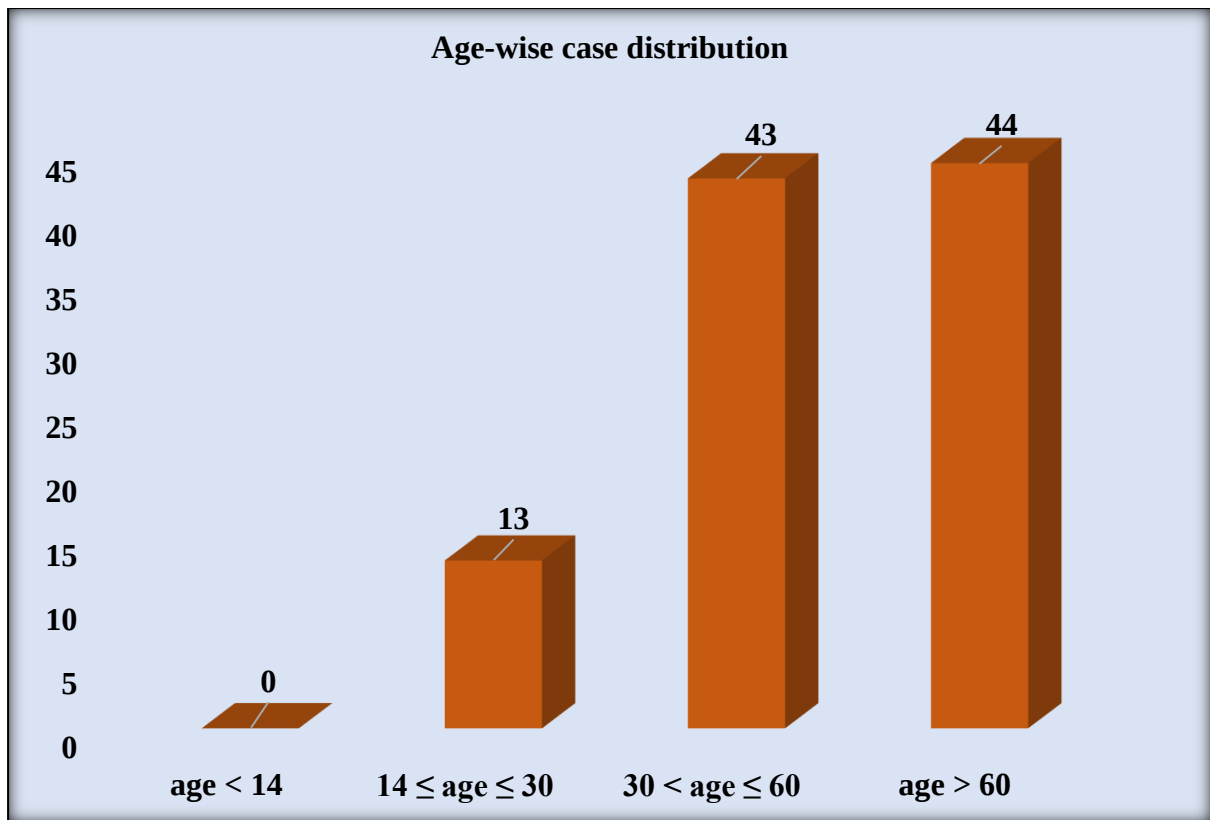
Month	Number of Phlebitis Cases
January	24
February	25
March	34

Table 1

*Figure 2*

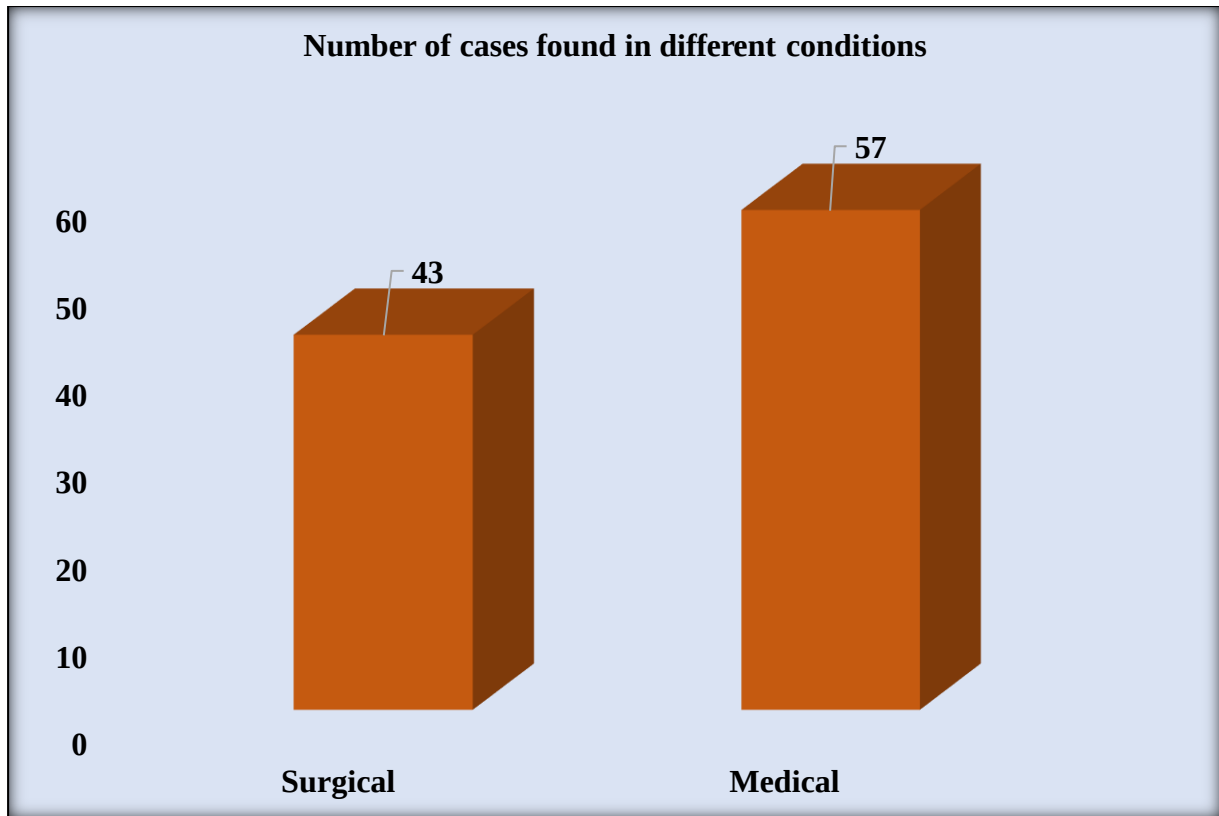
Gender	Number of Phlebitis cases
Female	27
Male	57

Table 2

*Figure 3*

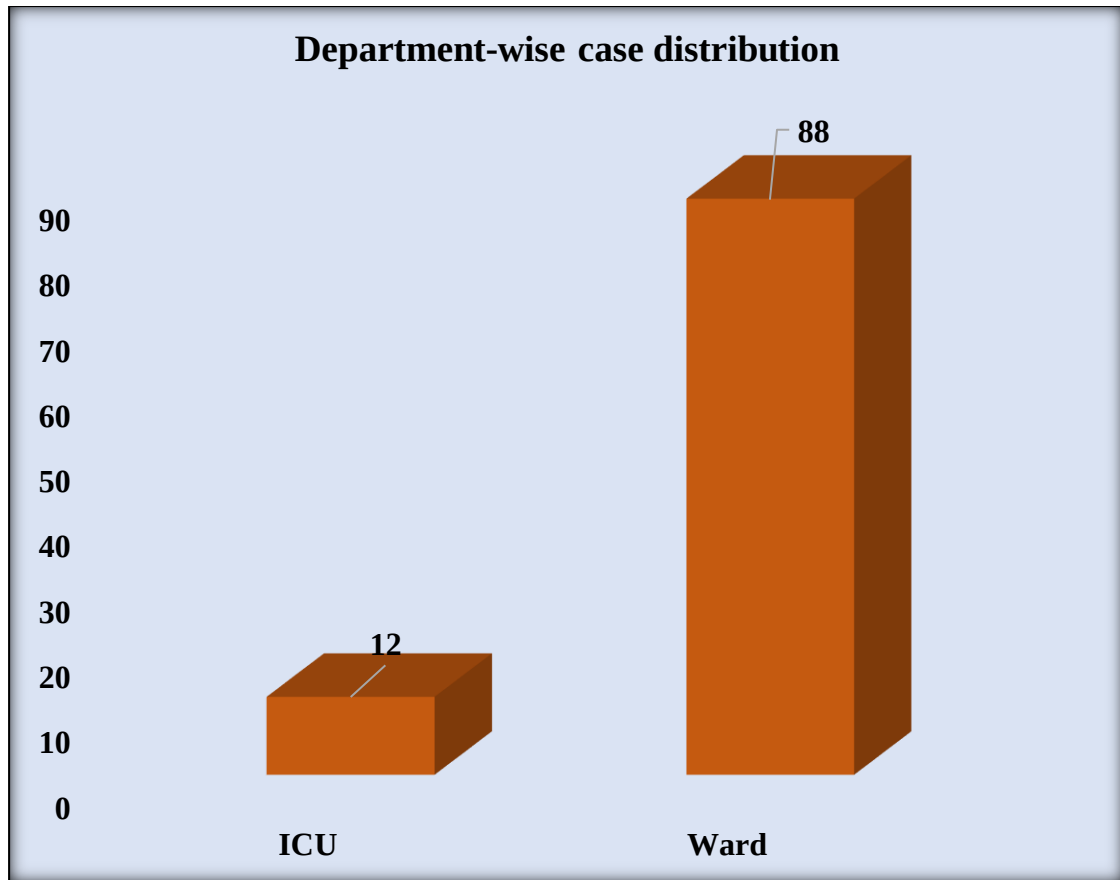
Age	Number of cases
age < 14	0
14 ≤ age ≤ 30	11
30 < age ≤ 60	36
age > 60	37
Total	84

Table 3

*Figure 4*

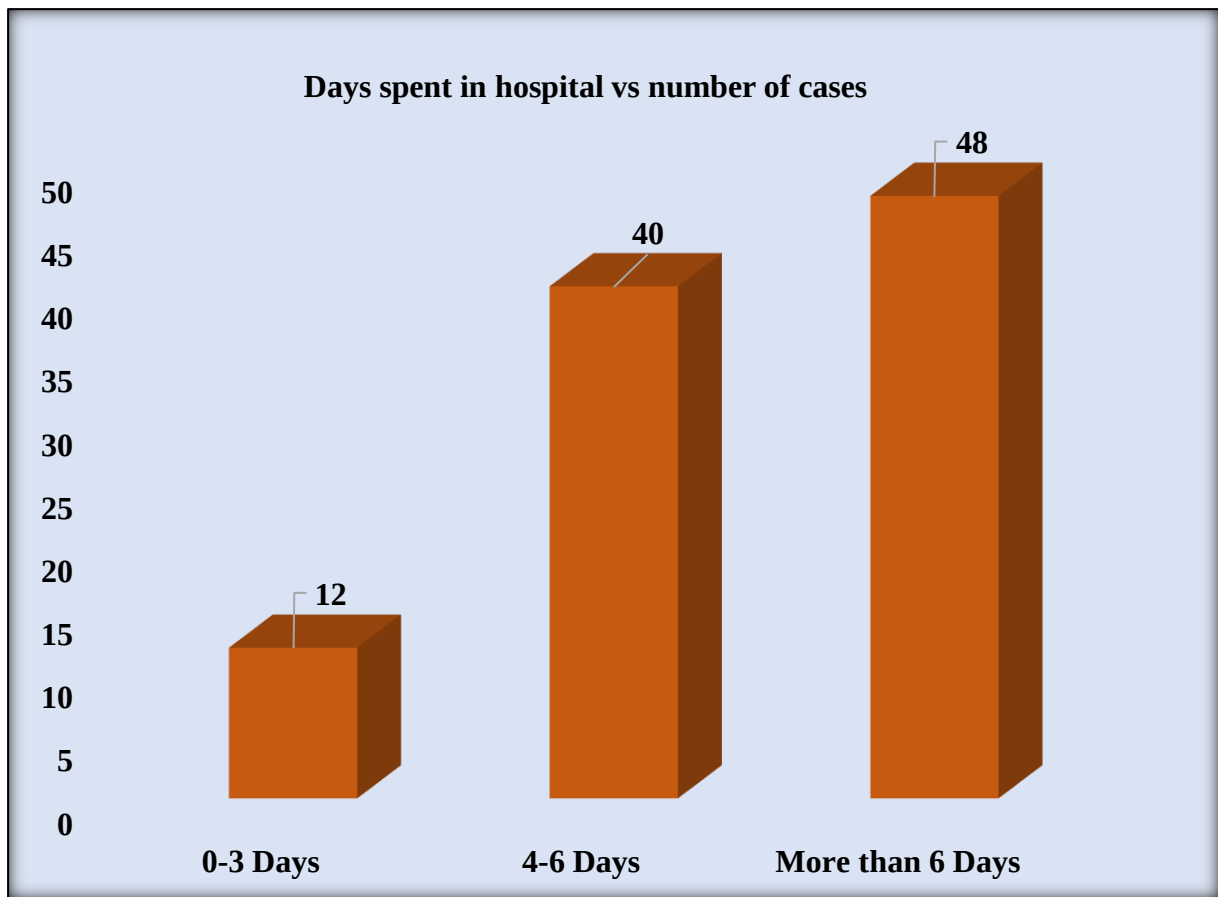
Condition	Number of Phlebitis Cases
Surgical	36
Medical	48

Table 4

*Figure 5*

Admission Department	Number of Phlebitis Cases
ICU	10
Ward	74

Table 5

*Figure 6*

Average stay duration	Number of cases
0-3 Days	10
4-6 Days	34
More than 6 Days	40

Table 6

Interpretation

- The study shows that there is a correlation between occurrence of phlebitis and average length of stay of patients. In **96.43 %** cases, the average hospital stay duration of patients was more than 2 days, it clearly suggests that phlebitis develops due to lengthy hospital stay, following the use of IV catheter for that much time period.
- **88 %** phlebitis cases were detected in the hospital wards, whereas only **11.9 %** cases were found in ICU,
- **57.14 %** cases were detected in the patients with medical condition, and **42.86 %** cases were detected in the patients with surgical condition, so there might be a possibility that surgical patients are having shorter hospital stay then the patients with medical conditions.
- In the month of March, phlebitis cases were increased, which might have happened due to rise in COVID cases.
- **32.14 %** phlebitis cases were observed in female patients, and **67.86 %** phlebitis cases were observed in male patients, so we can say that males are more prone to develop phlebitis infection than females.
- Highest number of cases were found in above 60 aged patients, so we can say that for developing phlebitis age factor plays a major role.

CH-2.1.4 Recommendations for Improvement

- Changing vein flow at early signs of phlebitis.
- Frequent observation of a patient.
- Phlebitis assessment scale is used to capture the first stage of phlebitis.
- Dressing should be performed immediately on the swelling area.
- Incidence should be reported immediately to the ICN and should also be informed to the treating doctor about the same.
- Findings of the phlebitis cases should be discussed in Audit committee meeting and Infection Prevention and Control Committee meeting.
- Training to be imparted for the good practice especially for ward staff with cannula insertion and proper skin disinfection.
- Identification of patients who are at risk of developing phlebitis, and the patients who fall under high-risk category.
- CVP should be measured in high-risk patients.
- Identification of drugs which are irritant to veins and that drugs should be injected only after measuring CVP.
- Selection of size of cannula based on vein of a patient.
- On job training should be given by ICN to the nursing staff.

Conclusion

- PIC is a commonly used invasive procedure performed on admitted patients in which phlebitis is a critical ongoing complication in routine practice.
- With the help of this study, it has become possible to analyze the risk factors of phlebitis due to the use of catheter.
- Based on our findings, we can conclude that there is a need of monitoring systematic indicators in continued quality care of the HCO, and to match the rates within the different contexts of nursing practice.
- To avoid the preventable risk factors, daily inspection of catheters and proper medical care are required to prevent the phlebitis. (Urbanetto, 2016)

CH-2.2 Doffing Case-study

CH-2.2.1 Introduction

Use of PPE is an uncommon practice in the routine provision of nursing care, which has now become common in this COVID era. Healthcare personnel often indulge into variety of hazardous working conditions with potential exposures to a variety of bacteria and viruses, where adherence to PPE protocols is often quite low. So, the need for teaching and training large numbers of HCWs in particular time intervals has been raised. The need for safe effective donning and doffing of PPE is a crucial part of protection for the HCWs. Appropriate use of PPE helps to minimise the potential for transition of communicable disease to their patients, their families, and therefore the public. (Larson EL, 2010)

Definition

Doffing : It is the practice of employees removing work-related protective gear, clothing, and uniforms. (TANSKI-PHILLIPS, 2019)

Problem Statement

Due to ongoing pandemic and therefore the number of health care providers infected with COVID-19 has raised the requirement of improved infection control training including PPE doffing procedure.

Aim

To evaluate the adherence of staff to the PPE doffing protocols.

Objective

- ✓ During removal, to avoid contamination to staff with the contaminated equipment.
- ✓ Identify benefits of using checklists for high-risk procedures, like doffing personal protective equipment during an infectious disease response.
- ✓ Evaluate adherence to the low and/or high output checklist and ability to doff PPE without being contaminated.

CH-2.2.2 Methodology

Study Type : Multiphasic Observational study

Mode of data Collection : Observation Method (Primary data)

Sample Size : 160 On-duty staff in COVID ward in between the time period of May-June, 2021 (4 hospital staff per day)

Sampling Technique : Purposive Sampling Technique

Sample Duration : May 2021 to June 2021 (2 months)

Study tool : Stepwise Doffing checklist (Given below in the annexure) *Checklist 2*

CH-2.2.3 Data Analysis

Pre-training Observations :

PPE Doffing Checklist				
Staff name : Mukesh		Observation Date : 15/05/2021		
Steps	Protocols of Doffing	Yes	No	Remarks
Step 1	Inspection of PPE for any splash/ tear/ cuts/ holes	√		
Step 2	If splash present on PPE, to be wiped with 1% hypo/ABHR. Wipe to be discarded in yellow bag		√	Splash was not wiped
Step 3	Sit on the chair and remove the shoe covers one at a time. Roll them down so that the inside of the shoe cover comes outside; discard in yellow bag	√		
Step 4	Sanitize your hands with alcohol-based hand rub		√	
Step 5	Remove the outer pair of gloves and discard in the red bag		√	Removed outer pair, but discarded in yellow bag
Step 6	Remove the gown; roll it inside out so that you touch only the inside; discard in the yellow bag		√	Touched outer part as well
Step 7	Sanitize your hands with alcohol-based hand rub		√	
Step 8	Remove goggles/ hood; discard in the red bag	√		
Step 9	Sanitize your hands with alcohol-based hand rub		√	
Step 10	Remove the N95 mask, first remove the lower strap over your head first, then remove the upper strap. Do not touch the front of the N95 mask. If you do, sanitize your hands. Discard the N95 mask in yellow bag.	√		
Step 11	Sanitize your hands with alcohol-based hand rub before leaving the doffing area	√		

Sample 1

PPE Doffing Checklist				
Staff name : Raj		Observation Date : 21/05/2021		
Steps	Protocols of Doffing	Yes	No	Remarks
Step 1	Inspection of PPE for any splash/ tear/ cuts/ holes	√		
Step 2	If splash present on PPE, to be wiped with 1% hypo/ABHR. Wipe to be discarded in yellow bag	√		
Step 3	Sit on the chair and remove the shoe covers one at a time. Roll them down so that the inside of the shoe cover comes outside; discard in yellow bag		√	Touched on contaminated part
Step 4	Sanitize your hands with alcohol-based hand rub		√	
Step 5	Remove the outer pair of gloves and discard in the red bag		√	Discarded in yellow bag
Step 6	Remove the gown; roll it inside out so that you touch only the inside; discard in the yellow bag	√		
Step 7	Sanitize your hands with alcohol-based hand rub		√	
Step 8	Remove goggles/ hood; discard in the red bag		√	Discarded in yellow bag
Step 9	Sanitize your hands with alcohol-based hand rub		√	
Step 10	Remove the N95 mask, first remove the lower strap over your head first, then remove the upper strap. Do not touch the front of the N95 mask. If you do, sanitize your hands. Discard the N95 mask in yellow bag.	√		
Step 11	Sanitize your hands with alcohol-based hand rub before leaving the doffing area	√		

*Sample 2***Post-training Observations :**

PPE Doffing Checklist				
Staff name : Mukesh		Observation Date : 09/06/2021		
Steps	Protocols of Doffing	Yes	No	Remarks
Step 1	Inspection of PPE for any splash/ tear/ cuts/ holes	√		
Step 2	If splash present on PPE, to be wiped with 1% hypo/ABHR. Wipe to be discarded in yellow bag	√		
Step 3	Sit on the chair and remove the shoe covers one at a time. Roll them down so that the inside of the shoe cover comes outside; discard in yellow bag	√		
Step 4	Sanitize your hands with alcohol-based hand rub	√		
Step 5	Remove the outer pair of gloves and discard in the red bag	√		
Step 6	Remove the gown; roll it inside out so that you touch only the inside; discard in the yellow bag	√		
Step 7	Sanitize your hands with alcohol-based hand rub	√		
Step 8	Remove goggles/ hood; discard in the red bag	√		
Step 9	Sanitize your hands with alcohol-based hand rub		√	
Step 10	Remove the N95 mask, first remove the lower strap over your head first, then remove the upper strap. Do not touch the front of the N95 mask. If you do, sanitize your hands. Discard the N95 mask in yellow bag.	√		
Step 11	Sanitize your hands with alcohol-based hand rub before leaving the doffing area	√		

Sample 3

PPE Doffing Checklist				
Staff name : Raj			Observation Date : 17/06/2021	
Steps	Protocols of Doffing	Yes	No	Remarks
Step 1	Inspection of PPE for any splash/ tear/ cuts/ holes	✓		
Step 2	If splash present on PPE, to be wiped with 1% hypo/ABHR. Wipe to be discarded in yellow bag	✓		
Step 3	Sit on the chair and remove the shoe covers one at a time. Roll them down so that the inside of the shoe cover comes outside; discard in yellow bag	✓		
Step 4	Sanitize your hands with alcohol-based hand rub	✓		
Step 5	Remove the outer pair of gloves and discard in the red bag	✓		
Step 6	Remove the gown; roll it inside out so that you touch only the inside; discard in the yellow bag	✓		
Step 7	Sanitize your hands with alcohol-based hand rub	✓		
Step 8	Remove goggles/ hood; discard in the red bag	✓		
Step 9	Sanitize your hands with alcohol-based hand rub	✓		
Step 10	Remove the N95 mask, first remove the lower strap over your head first, then remove the upper strap. Do not touch the front of the N95 mask. If you do, sanitize your hands. Discard the N95 mask in yellow bag.	✓		
Step 11	Sanitize your hands with alcohol-based hand rub before leaving the doffing area	✓		

Sample 4

Pre and Post training comparison :

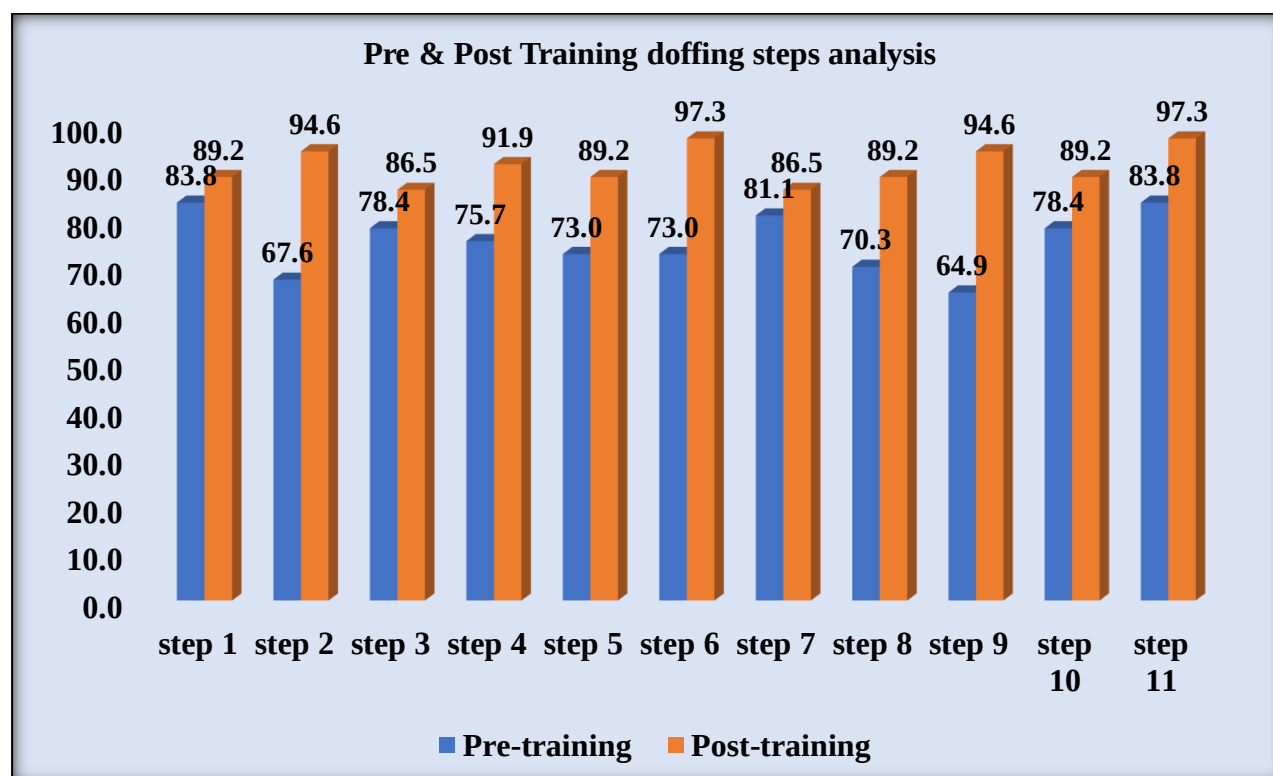
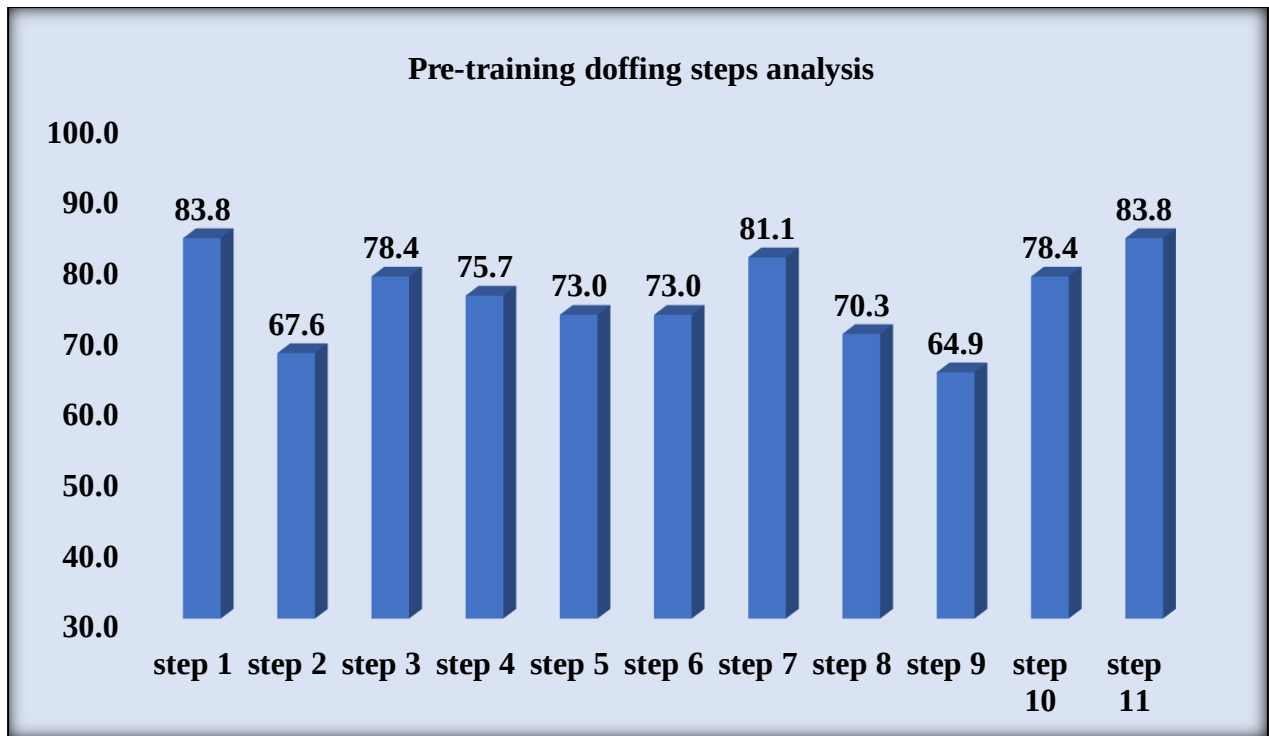
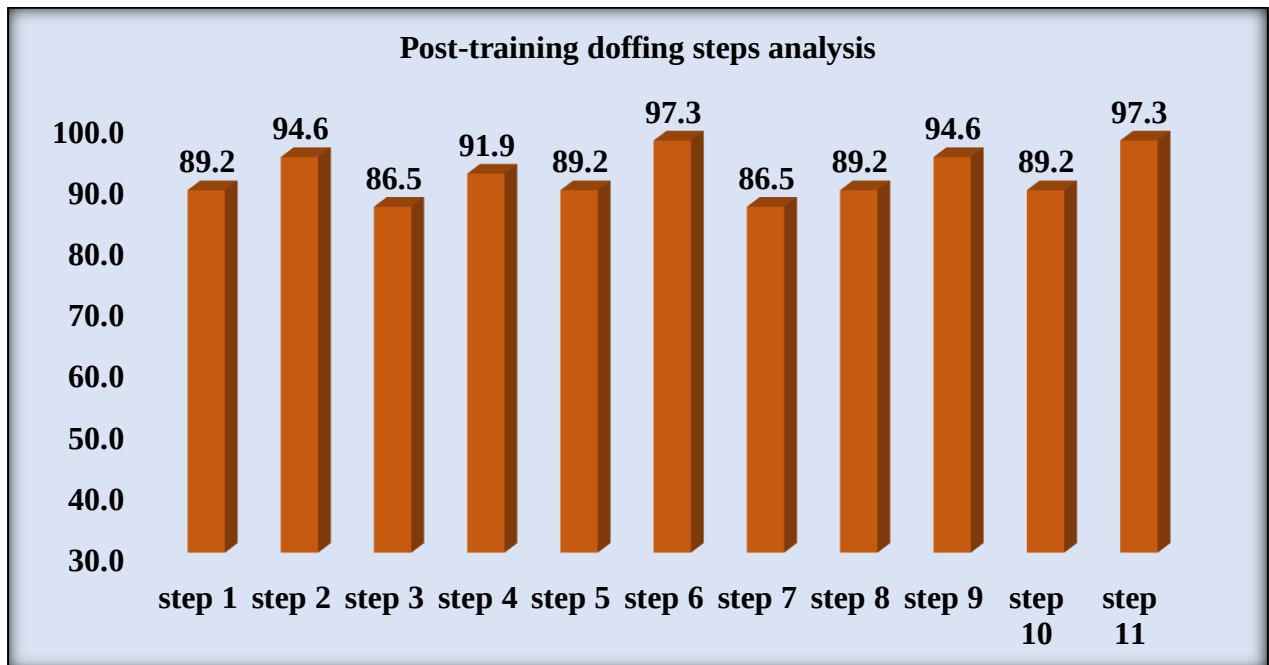


Figure 7

*Figure 8**Figure 9*

Interpretation

Pre-training Data Analysis :

- The mean doffing score was found 75.4% before conducting the training process of doffing.
- When the PPE protocol was introduced, the staff was not aware of that protocols, due to that reporting was poor and the PPE components were either not reported or poorly reported or the protocol was altered.
- In many cases, it was observed that HCW take off gloves incorrectly during doffing process.
- In 83.8% of the cases, staff was making multiple errors regarding the removal of gloves, like touching glove with a gloved hand or touching the inside the gown, touching the glove with bare hands or outside the gown.
- The most frequent errors occurred **during disinfecting the feet** (78.4%) and **discarding the scrubs** (64.9%). The most vulnerable processes were removing respirators/mask (78.4%), removing the shoe covers (78.4%), and removal of the hood (70.3%). Some findings were related to facility available during doffing process, which includes :
 - Unavailability of glove box
 - Shortage/Unavailability of mask
 - Lack of quick refilling of hand-rub
 - Unavailability of dirty chair, where one will sit to take off his/her boot covers only.
 - Lack of quick emptying process of BMW

Corrective Actions :

- From our study, it was noted that there was an extreme need to change the training protocols used for PPE at HCO. So, conducted a training on PPE doffing protocols.
- The study has raised the need to change the PPE design and to revise the policies and procedures, which was included in the training shown in the pictures below.
- Complete facility provided for doffing process and staff was trained to check the doffing facility at particular intervals.

Post-training Data Analysis :

- The mean doffing score was found 91.4 % after conducting the training process of doffing.
- The most frequent errors were recovered after conducting the training session.

Limitations of the study :

- The audit was conducted at the time of shift change at 2:00 pm daily.
- So, evening shift staff was not covered, so the observation of only one shift was covered.

CH-2.2.4 Recommendations for improvement

- Introduction of “Buddy System”, having a PPE buddy to observe & correct the doffing process might reduce the self-contamination risk and it will help to implement the safe doffing practice in the HCO.
- Include PPE doffing training in the induction.
- Safe practice of wearing and removing PPE by each employee working in COVID wards on daily basis.

Conclusion :

- Research has shown that the removal of Personal Protective Equipment can be considered as a high-risk phase for the transfer of pathogens from the PPE to the wearer of the PPE.
- As per current scenario, there is an extreme need to improve the teaching method and the process of PPE doffing among HCWs.
- Proper training and implementation of Buddy System will decrease the risk of contamination during doffing process.
- By including PPE doffing training in the induction program itself, the HCW would be able to stay safe from the doffing related infection since the first day.

Chapter 3 References

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Chapter 4 Annexure

CH-4.1 Time Schedule

Name of Department/ Project/ Activity	Dates of Visit (2021)	% of Time Spent	Interacted with (Name and Designation)
Laboratory	10th May	1.62	Mrs. Jagruti Soni (HOD)
IT Department	11th May	1.04	Mr. Alpesh Prajapati (Incharge)
OPD	12th May	1.04	Dr. Smita Sukhthankar (HOD)
Radiology	12th May	1.04	Dr. Mansi Gajjar (Radiology Coordinator)
Admissions	13th May	0.46	Mrs. Pratima Kansara (Floor Manager)
Mediclaime (TPA)	13th & 19th May	1.39	Ms. Asha (Mediclaime Incharge)
Billing Desk	13th May	0.46	Mr. Ashfaq (Billing Incharge)
Emergency	13th May	0.46	Mr. Jay (ER Incharge)
Pharmacy (3 Departments)	13th, 14th & 17th May	0.93	Mr. Prashant Gayakwad (HOD)
Supply Chain and Procurement	15th May	0.93	Mr. Narayan (HOD)
Maintenance Department	15th May	0.93	Mr. Yogesh Patel (Maintenance Incharge)
ICU	17th & 24th May, 1st & 30th June	0.69	Dr. Arool Shukla (HOD)
OT	17th & 24th May, 19th & 30th June	1.85	Mrs. Priyanka (OT Incharge)
Quality Department	18th & 31st May, 10th & 24th June	5.56	Ms. Khushbu Jariwala (Senior Executive Quality Manager)
Training	18th & 27th May, 18th & 21st June, 2nd July	4.99	Ms. Priyanka Tailor (L & D senior Manager)
IPD	11th, 19th & 22nd May, 22nd June	4.63	Mrs. Suma Besaly (ICN)
Kitchen & Cafeteria Orientation	20th May	1.39	Mrs. Reshma Chauhan (Dietitian & Nutritionist)
Cathlab	17th & 22nd May, 26th & 30th June	1.39	Mr. Jinu (Cathlab Incharge)

Dialysis	25th May, 2nd & 25th June	0.93	Mr. Nimesh Dalal (Department Incharge)
Outsource visit	31st May	0.93	Ms. Khushbu Jariwala (Senior Executive Quality Manager)
MRD	14th May, 1st June	2.78	Mr. Hardik Prajapati (Department Incharge)
Physiotherapy	14th May	0.23	Dr. Nrutika Shah (physiotherapy Incharge)
Lunch-break	Daily	5.56	-
Doffing Case study	Daily	21.06	Dr. Sanjana Desai (Clinical Applications Manger)
Phlebitis Case study	24th, 28th & 29th May, 1st, 3rd & 4th June	19.21	Mr. Jestin Jacob (Nursing Superintendent)
NABH Submission Process Learning and report making	21st, 22nd, 24th, 25th & 26th May, 1st, 2nd, 5th, 7th, 9th, 10th, 11th & 12th June	15.51	Ms. Khushbu Jariwala (Senior Executive Quality Manager)
Celebration / Function/ Event	21st June, 1st & 22nd July	2.78	Ms. Priyanka Tailor (L & D senior Manager)

Table 7

CH-4.2 Phlebitis Case-study

CH-4.2.1 Data Collection Tool

IV site appears normal	0	No visible Sign of phlebitis
One of the following is evident: • Mild pain near IV site or • Mild redness near IV site	1	Possible first signs
Two of the following are evident: • Swelling • Pain at IV site • Erythema	2	Early stage of phlebitis
All of the following signs are evident: • Induration • Swelling along path of cannula • Erythema	3	Mid stage of Phlebitis
All of the following signs are extensive and evident: • Swelling along path of cannula • Induration • Erythema • Palpable venous cord	4	Advanced stage of phlebitis or start of thrombophlebitis
All of the following signs are extensive and evident: • Swelling along path of cannula • Induration • Erythema • Pyrexia • Palpable venous cord	5	Advanced stage of thrombophlebitis

Checklist 1

CH-4.3 Doffing Case-study

CH-4.3.1 Data Collection Tool

Steps	Protocols of Doffing
Step 1	Inspection of PPE for any splash/ tear/ cuts/ holes
Step 2	If splash present on PPE, to be wiped with 1% hypo/ABHR. Wipe to be discarded in yellow bag
Step 3	Sit on the chair and remove the shoe covers one at a time. Roll them down so that the inside of the shoe cover comes outside; discard in yellow bag
Step 4	Sanitize your hands with alcohol-based hand rub
Step 5	Remove the outer pair of gloves and discard in the red bag
Step 6	Remove the gown; roll it inside out so that you touch only the inside; discard in the yellow bag
Step 7	Sanitize your hands with alcohol-based hand rub
Step 8	Remove goggles/ hood; discard in the red bag
Step 9	Sanitize your hands with alcohol-based hand rub
Step 10	Remove the N95 mask, first remove the lower strap over your head first, then remove the upper strap. Do not touch the front of the N95 mask. If you do, sanitize your hands. Discard the N95 mask in yellow bag.
Step 11	After removing inner pair of gloves, Sanitize your hands with alcohol-based hand rub before leaving the doffing area

Checklist 2

CH-4.3.2 Stepwise Data Analysis Sample

Staff Name	step 1	step 2	step 3	step 4	step 5	step 6	step 7	step 8	step 9	step 10	step 11
Shital	1	1	1	1	1	1	1	1	1	1	1
Mathews	1	1	1	1	0	1	1	1	1	1	1
Mahesh	1	0	1	1	1	0	1	0	0	0	0
Mahima	1	1	1	1	1	1	1	1	0	1	1
Girishma	1	1	1	0	0	0	0	1	1	1	1
Sruthi	0	1	1	1	1	0	1	1	1	1	1
Sradha	1	1	0	1	1	1	1	1	1	0	1
Arpit	0	1	1	0	1	1	1	0	0	1	1
Divya	1	0	1	1	1	1	1	1	1	1	1
Sunitha	1	1	1	1	1	1	1	1	1	1	1
Tejasvi	1	1	1	1	1	1	1	1	1	1	0
Sunika	1	1	0	0	1	1	1	0	1	1	1
Rahul	1	1	1	1	0	1	1	1	0	1	1
Rafi	1	1	1	1	0	1	1	1	1	1	0
Tanvika	1	1	1	1	1	1	0	0	0	1	1
Chirag	0	0	0	1	1	1	1	1	1	0	1
Nayna	1	1	1	1	1	0	1	1	1	1	1
Suvarana	1	1	0	1	1	1	1	1	1	1	1
Imran	1	1	1	0	0	1	1	0	1	1	1
Payal	1	1	1	1	1	1	1	1	0	0	1
Jolly	0	0	1	0	1	1	0	1	1	1	1
Mahendra	1	1	1	1	1	0	1	1	1	1	0
Waseem	1	0	1	0	1	1	0	0	0	1	1
Kinjal	1	0	1	1	0	1	1	1	1	1	1
Siddhi	1	1	1	1	1	1	1	0	0	0	1
Kusa	1	1	0	1	1	1	1	1	1	1	1
Anand	0	1	1	1	1	1	1	1	1	1	1
Mukesh	1	0	1	0	0	0	0	1	0	1	1
Chaya	1	0	1	1	1	1	1	1	0	0	1
Sandeep	1	1	1	1	0	0	1	1	1	1	0
Raj	1	1	0	0	0	1	0	0	0	1	1
Pravin	1	0	1	1	1	0	1	1	1	1	0
Arun	1	1	1	1	1	1	1	0	0	0	1
Bhakti	1	0	0	1	0	0	1	1	1	1	1
Anjali	1	0	1	1	1	0	1	0	1	1	1
Anjal	1	0	1	1	1	1	1	1	0	1	1
Shalini	0	1	0	0	1	1	0	0	1	0	1

Sample 5

Doffing Training Pictures :

















THE END