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# A Manual for Operation Theater Technicians

2nd Edition

*Previously known as*
*Textbook for Operation Theater Technicians*

***As per the Latest Syllabus and Guidelines of 'Diploma in Operation Theater Technicians'***



**Neelam Rai**
**Arpit Ravindra Lal**

*Forewords*
**Pratiksha John**
**Asif Masood**

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# CHAPTER 4

# Basics of OT Techniques, CSSD Techniques and Anesthesia Technique

**Chapter Outline**

- Handwashing and Surgical Scrubbing
- Preoperative Preparation of Patient Including Surgery Site
- Postoperative Care Including Dressing
- Methods of Sterilization and Basic Functioning of CSSD
- Central Sterile Supply Department
- Various Positions Used in Different Surgeries
- Anesthesia, Boyle's Machine and Anesthesia Work Station
- Gases Used in Anesthesia
- Triage of Patients
- Details of Hand Instruments Used in Common Surgeries
- Preanesthesia Checkup
- Infection Control in OT
- Basic Ideas of Different IV Fluids
- Needles, Sutures and Knots
- Cauterization (Cautery)

## HANDWASHING AND SURGICAL SCRUBBING

Hand washing is important in every setting, including hospitals. It is an effective infection control measure, as it prevents the spread of microorganisms. For routine client care, the center for disease control (CDC) recommends vigorous hand washing under a stream of water for at least 10 seconds using soap **(Fig. 4.1)**.

Hand washing should be done:

- When there are known multiple resistant bacteria.
- Before invasive procedures.
- In special care units, such as nurseries, ICUs and OTs.

### Purpose

- To remove transient and resident bacteria from fingers, hands and forearms.
- To prevent the risk of transmission of infection to patients.

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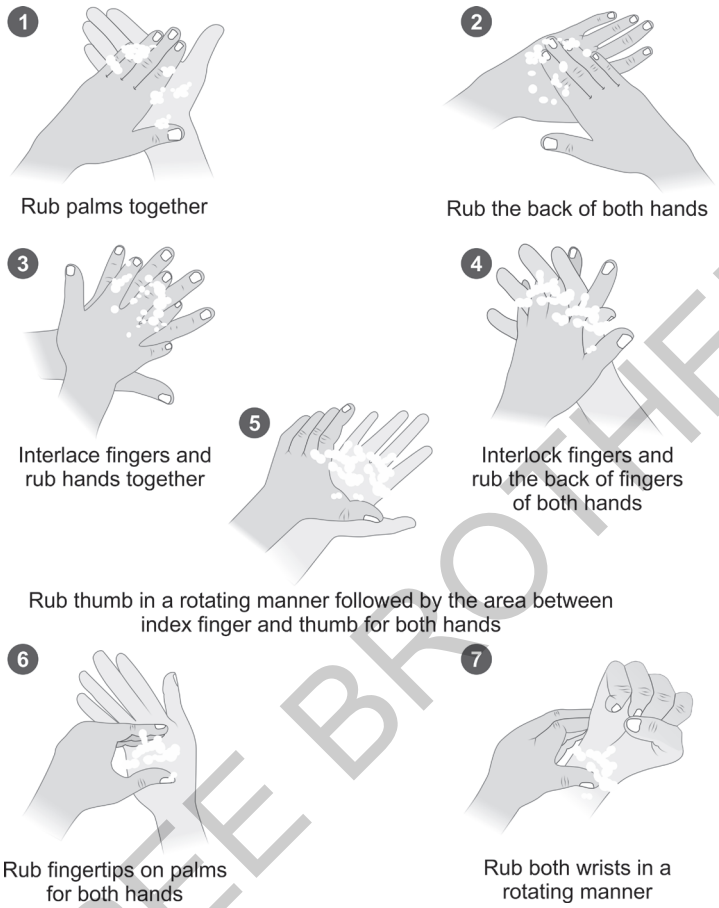


**Fig. 4.1:** Steps of handwashing.

- To reduce the risk of transmission of infection organisms to oneself.
- To prevent cross infection among clients.

## Equipment/Articles

| *Articles* | *Rationale* |
|---|---|
| Soap in a soap dish | Soap contains antibacterial agents and has a lasting bacteria static effect |
| Nail brush | To clean nails |
| Running water | To rinse soap and thoroughly wash hands |
| Towel | To dry hands |

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## Steps of Procedure

| *Steps* | *Rationale* |
|---|---|
| File the nails short; ensure that nails are free of nail polish | Short nails are less likely to harbor resident and transient microorganisms |
| Remove all jewelry and wrist watch | Microorganisms can be inside the settings of jewelry and under rings. Removal facilitates proper cleaning of hands and arms |
| Turn on the water to adjust the flow so that water is lukewarm. | Warm water removes less of the protective oil of the skin than hot water |
| • **Medical asepsis:** Wet the hands thoroughly by holding the hands lower than the elbows so that water flows from arms to fingertips | It allows water to flow from the least contaminated area (elbow) to the most contaminated area (hands) |
| • **Surgical hand washing:** Wet hands and forearms liberally, keeping arms and hands above elbow level during the entire procedure | Water runs by gravity from fingertips to elbows. Keeping hands elevated allows water to flow from least to the most contaminated area |
| Apply liberal amounts of soap into hands and later hands and arms using hand brushes | Soap emulsifies the oil and lowers the surface tension of water, facilitates the removal of micro-organisms, dust and oils. Brushes are used to enhance mechanical friction during hand washing |
| Thoroughly wash and rinse the hand using firm rubbing and circular movements to wash the palm, back and wrist of each hand. Interlace the fingers during hand washing | The circular action helps to remove micro-organisms mechanically. Running water and friction used in cleaning are the mechanical action of cleaning |
| Dry arms and hands thoroughly from fingers to wrists and forearms. Discard the towel in a proper container | Drying helps in removing moisture, prevents chapping and roughening of skin. Drying from cleaner to least clean area prevents contamination |
| Turn off the water tap using a paper towel or using an elbow | The handle is contaminated. Use of a paper towel or washed hands |

## Gowning

Clean or disposable gowns or plastic aprons are worn during procedures when the nurse's uniform is likely to become soiled. Sterile gowns may be indicated when the nurse changes the dressings of a client with extensive wounds, burns, etc. **(Fig. 4.2)**.

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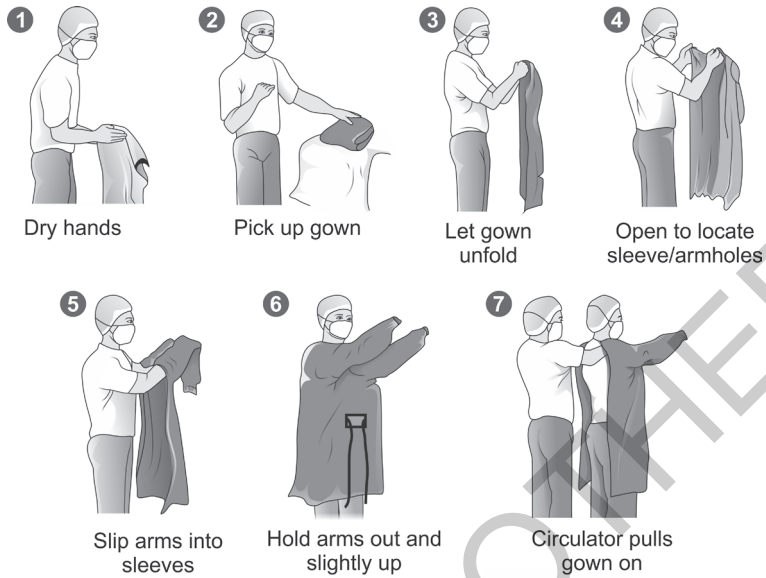


**Fig. 4.2:** Steps of gowning.

### *Procedure*

Gowning technique (sterile).

### *Purpose*

- To prevent soiling of clothes during contact with the patient.
- To protect health care personnel from coming in contact with infected material.

### *Steps of Procedure*

| *Steps* | *Rationale* |
|---|---|
| Pick up a sterile gown and allow it to unfold keeping inside of the gown towards the body without allowing the outside of the gown to touch any area | To prevent soiling/contamination of the gown |
| With hands at shoulder level, slip both arms into armholes simultaneously. Ask the circulating nurse to bring the gown over shoulders | It prevents contamination of the sterile gown |
| The circulating nurse fastens the ties at neck. Overlap the gown at the back as much as possible and fasten the waist, ties or belt | It keeps the gown at place and covers the uniform at the back |

*Contd...*

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| *Steps* | *Rationale* |
|---|---|
| Prevent the gown from becoming wet | Moisture allows organisms to travel through the gown to the uniform |
| While removing avoid touching soiled parts on the outside of the gown. Roll up the gown with the soiled part inside and discard in the appropriate container | It prevents contamination of the uniform. It prevents cross-inflection |

## Gloving

Gloves are worn to protect hands when the nurse is likely to handle any body substances, e.g., blood, urine, fasces, sputum, mucous membranes and nonintact skin. Gloves also reduce the likelihood of the nurse's transmitting their own endogenous microorganisms to individuals receiving care. For most activities, disposable clean gloves are used. Sterile gloves are used when the hands will come in contact with an open wound or when the hands might introduce microorganisms into a body orifice **(Fig. 4.3)**.

### *Procedure: Wearing and Removing Disposable Gloves*

| *Gloving* | *Rationale* |
|---|---|
| Thoroughly wash hands | Removes bacteria from skin surfaces and reduces transmission of infection |
| Open a sterile glove packet of proper size on a flat surface above waist level | A sterile object held below waist gets contaminated |
| If gloves are not powdered, take a packet of powder and apply lightly to hands | Powder allows gloves to slip on easily |
| Identify right and left hand. Glove dominant hand first | Proper identification of gloves prevents contamination by improper fit |
| With thumb and the first two fingers of the nondominant hand, grasp and edge of the glove's cuff. For dominant hand, touch only the glove's inside surface (Step 1) | Inner edge of the cuff will lie against skin and thus is not sterile |
| Carefully pull the glove over the dominant hand. Ensure the thumb and fingers are in proper spaces (Step 2) | Proper fitting of gloves on fingers |
| With gloved dominant hand, slip fingers underneath the second glove's cuff (Step 3) | This prevents glove contamination |

*Contd...*

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| *Gloving* | *Rationale* |
|---|---|
| Carefully pull the second glove over the nondominant hand. Do not allow fingers of the thumb of the gloved dominant hand to touch any part of the exposed nondominant hand (Step 4) | Contact of the gloved hand with the exposed hand results in contamination |
| After the second glove is on interlock hands together (Step 5) | Ensures smooth fit over fingers |

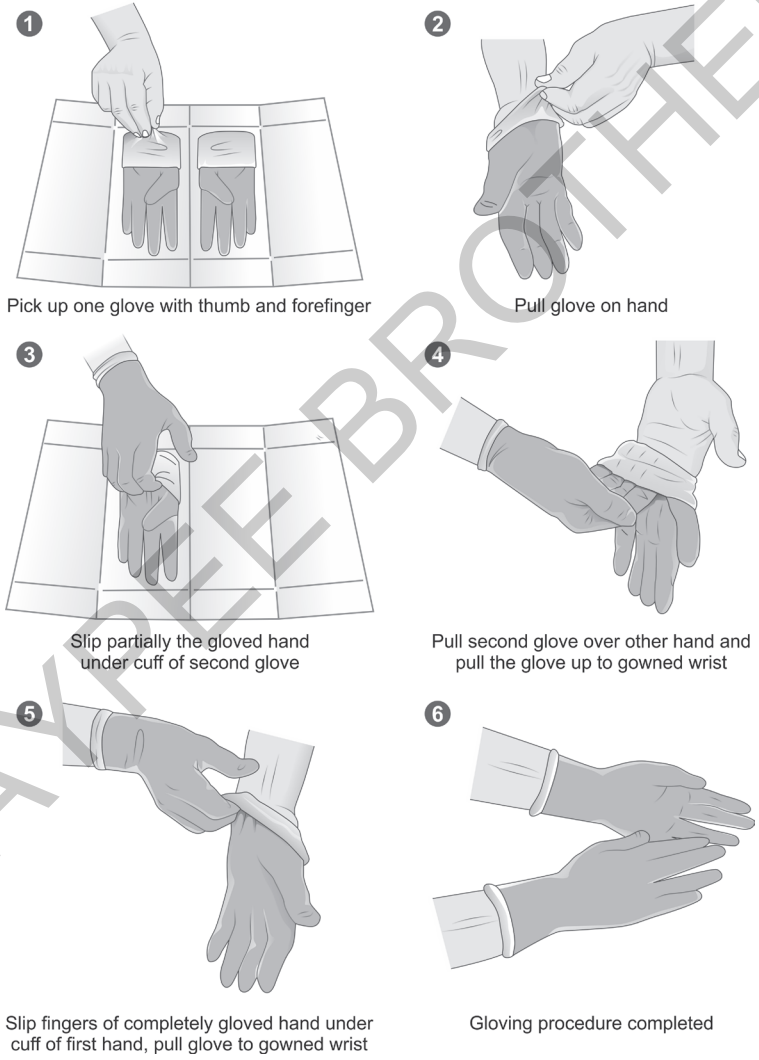


**Fig. 4.3:** Steps of gloving.

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### *Removing Disposable Gloves*

| | |
|---|---|
| Remove the first glove by grasping it on its palmar surface just below the cuff, taking care to touch only glove to glove. Pull the first glove completely off by inverting or rolling the glove inside out | This keeps the soiled parts of the used gloves from touching the skin of the wrist or hand |
| Place the first two fingers of the bare hand inside the glove and remove the second contaminated glove | To prevent touching the outside of the second soiled glove with the bare hand |
| Dispose them of in the appropriate container | To prevent cross infection |

## Wearing Masks

Masks are worn to reduce the risk for transmission of organisms by the droplet contact, air borne routes, and splatters of body substances. The CDC recommends that masks should be worn:

- By personnel who work close to the client if the infection is transmitted by large particle aerosols, e.g., measles, mumps, acute respiratory diseases in children.
- By all personnel entering the room if the infection is transmitted by small particle aerosols (droplet nuclei); e.g., pulmonary tuberculosis.

### *Procedure*

**Using disposable mask:**

| *Putting of mask* | *Rationale* |
|---|---|
| Hold mask by top two strings. Tie two top ties at the top of the back of the head with ties above ears | Position of ties at the top of the head provides a tight fit. Ties over ears may cause irritation |
| Tie two lower ties snugly around the neck with the mask well under the chin | Prevents escape of micro-organisms through sides of the mask |
| Ensure that the mask covers the mouth and the nose adequately | Prevents (inhalation and escape of) microorganism from and into the air |
| If glasses are worn, fit the upper edge of the mask under the glasses | To prevent glasses from clouding |
| Avoid unnecessary talking and, if possible, sneezing or coughing | To prevent the mask from getting moist |
| When removing a mask with strings, first untie the lower strings of the mask | To prevent the top part of the mask from falling on to the chest |

*Contd...*

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| *Putting of mask* | *Rationale* |
|---|---|
| Discard a disposable mask in the waste container | To prevent cross infection |
| Wash the hands if they have become contaminated by accidentally touching the soiled part of the mask | To prevent infection |

## *Principles of Surgical Asepsis*

| *Principles* | *Reasons* |
|---|---|
| Always face the sterile field. Do not turn your back or side on a sterile field | Sterile objects, which are out of vision, are considered questionable and their sterility cannot be guaranteed |
| Keep sterile equipment above your waist level or above table level | Because waist level and table level are considered margins of safety and will promote a maximum sterile field |
| Do not speak or cough over a sterile field. If it is necessary to do so, turn your head from the sterile field | To prevent droplet infection |
| Never search or cross a sterile field | When a nonsterile object crosses the sterile field, gravity causes the microorganisms to fall into the sterile field |
| Prevent excessive air currents around sterile areas. Air current can be caused by moving fast, flapping the cloth sand drapes and by closing the doors etc. | Microorganisms are present in the air and they travel in air current |
| Keep the wet unsterile object away from the sterile field | Microorganisms may be transferred whenever a nonsterile wet object touches a sterile field. The micro-organisms may be transferred consequently. The sterile area becomes unsterile by capillary action |
| Keep the sterile field dry | Microorganisms do not pass easily through a dry surface |
| Handle liquids cautiously near the sterile field or prevent drapes or wrappers from becoming wet | When a liquid comes in contact with a notsterile field, the microorganisms may be transferred. Consequently, the sterile area becomes unsterile by capillary action |
| The edge of the sterile field is considered unsterile | Proximity to a contaminated area makes sterility doubtful |

*Contd...*

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| *Principles* | *Reasons* |
|---|---|
| Each sterile supply should be clearly labelled as to its contents, time and date of sterilization | To ensure sterility |
| Never assume that an object is sterile. Always check the expiry date of sterility | Sterility of an object wrapped in paper or cloth becomes doubtful after four weeks and those sealed in polythene bags become doubtful after one year |
| Avoid sweeping and dusting when sterile objects are opened | Microorganisms travel in dust particles |
| Wash hands, put on gowns, gloves and mask before handling the sterile supplies | To prevent contamination |
| Open the sterile package in such a way that the edges of the wrapper are directed away from the worker | To avoid the possibility of a sterile surface touching the uniform |
| Hold the transfer forceps pointing downwards | To prevent the solution from flowing into the contaminated areas (the handle of the forceps) and then back to the sterile area (the tip of the forceps) |
| When removing the forceps from the container lift it without touching the sides and the rim of the container | The tip of the forceps becomes contaminated when touching the container that is not in direct contact with the disinfectant solution |
| Keep the prongs together directly over the container to remove the excess solution | To prevent the solution from dribbling onto the sterile field and wet it |
| Transfer forceps and the container should be sterilized daily | There is a great possibility of these articles becoming contaminated because of the frequency and varied use |

### *Use of the Container: With Sterile Supplies*

| | |
|---|---|
| Remove the cover from the container when necessary and only for a short period | Air currents can contaminate the cover |
| Leave the cover of the container in such a way that the inside of the lid is pointing downwards | Air currents can contaminate the inside of the cover |
| Invert the cover only when it is necessary to place it downwards | Contact with the unsterile surface contaminates sterile objects |

*Contd...*

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| | |
|---|---|
| Consider the rim of the cover and the container to be contaminated | Proximity to a contaminated area makes the sterility doubtful |
| Do not return the unused sterile objects to the container, once they have been taken out | It is considered to be contaminated by air currents |

## PREOPERATIVE PREPARATION OF PATIENT INCLUDING SURGERY SITE

### Introduction

- To obtain satisfactory results in general surgery requires a careful approach to preoperative preparation of patients.
- Specific patient groups have specific needs
- High-risk patients should be identified early and appropriate measures taken to reduce complications.

### Preoperative Preparation for Surgery

- Prior to consideration of surgical intervention, it is necessary to prepare the patient as fully as possible so as to optimize him according to his comorbidities.
- The extent of preoperative preparation will depend on:
  - Nature of surgery (minor or major)
  - Facilities available
  - Preoperative preparation for surgery
- **Situation:**
  - *Emergency:* Life-threatening condition requiring immediate action (e.g., ruptured aneurysm, penetrating trauma, peritonitis).
  - *Urgent:* Surgery required within few hours (e.g., intestinal obstruction, appendicitis, wound debridement).
  - *Elective:* For example, hernia, varicose vein, colorectal malignancies, breast malignancy)

### Complication

#### *Elective Urgent Emergency*

- The rational for preoperative preparation is to: anticipate difficulties.
  - Make advanced preparation and organize facilities, equipment and expertise.
  - Enhance patient safety and minimize chances of errors.

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- Relieve any relevant fear/anxiety perceived by patient.
- Routine preparation for surgery

❖ History
❖ Physical examination
❖ Special investigation
❖ Informed consent
❖ Marking the site/side of operation
❖ Thromboembolic prophylaxis
❖ Antibiotic prophylaxis

## Preparing for Surgery

Preparations for surgery depend on your diagnosis. Your physician will discuss with you how to prepare for your surgery. However, if you will undergo general anesthesia, you may be asked to do the following:

❖ Stop drinking and eating for a certain period of time before the time of surgery.
❖ Bathe or clean, and possibly shave the area to be operated on.
❖ Undergo various blood tests, X-rays, electrocardiograms, or other procedures necessary for surgery.
❖ Sometimes a patient may be asked to take an enema the evening before surgery, to empty the bowels. Please check with your physician.
❖ Do not wear makeup the day of surgery
❖ Do not wear nail polish
❖ Do not wear your eye contacts
❖ Leave valuables and jewelry at home
❖ Advise the medical staff of dentures or other prosthetic devices you may be wearing.

Often, to make their experience more comfortable and efficient, patients are advised to bring the following:

❖ Loose-fitting clothes to wear
❖ Social security card number
❖ Insurance information
❖ Medicare or medicaid card

## Surgical Site Preparation

Important to consider the best surgical site preparation routine:

❖ Hair removal
❖ Preoperative and intraoperative skin preparation solutions
❖ Sterile draping

Preparation is extended well beyond the surgical margins to ensure that the areas surrounding the incisions are properly sterilized.

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Iodine, alcohol, and chlorhexidine-based preparations have been shown to reduce bacterial burden at various surgical sites.

Awareness of the recommended skin preparation solution based on anatomic location of surgery is warranted due to local microbiome and skin flora (i.e., shoulder area higher bacterial burden of *Cutibacterium acnes* which chlorhexidine solution is recommended.)

## Surgeon Tools/Recommendations

### *Hair Removal*

- Remove hair with a dedicated clipping device with a prepackaged razor in the preoperative area the same day as surgery before entrance into the sterile operating room setting.
- Proper disposal of the razor after each patient is advised.

### *Preoperative/Preadmission Skin Preparation*

- Recommend patients' perform specific cleanses of surgical site while at home the day before and morning of surgery.
  - Includes shower with chlorhexidine solution or using wipes at home.
- On the day of surgery, gently wipe the skin with either an alcohol or chlorhexidine-based solution (i.e., 70% isopropyl alcohol, chlorhexidine gluconate) in the preoperative area or in the operating room to provide a preliminary cleanse of the entire surgical field.
- Consider the fire risk associated with isopropyl alcohol in the operating room.
  - May be required to isolate surgical field with clear drapes to ensure that the alcohol-based solutions do not saturate cloth or fabric to reduce the risk of fire.
- Allow optimal drying time for specific initial preparatory solution to maximize adhesion and technique or proper sterile draping.

### *Intraoperative Skin Preparation*

- Iodine, alcohol, and chlorhexidine-based solutions are used after the surgical site has been appropriately isolated, marked and the team has appropriate visualization and working area to successfully complete the procedure.
- Allow each of the skin preparation solutions adequate time to dry
  - Follow manufacture's recommendations for drying time.
- Be aware that some surgical skin preparation solutions have been shown to have a greater propensity for erasing surgical markings than others.

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# A Manual for Operation Theater Technicians

*A Manual for Operation Theater Technicians* is a precise guide not only for the students, but also helpful for OT technicians, staff nurses working in the surgical ward, nurse educators, physicians and surgeons. It covers all the needed areas required for a student of OT technician. This book has been divided into two parts containing six chapters. Each chapter is well-framed and made all possible efforts in this respect—used simple and easy language with all practical measures that are useful for an OT technician.

**Neelam Rai** has completed her PhD from Venkateshwara University, Gajraula, Uttar Pradesh, India. She is a postgraduate from Mansarovar Nursing College, Bhopal, Madhya Pradesh, India and graduate of Army College of Nursing, Jalandhar, Punjab, India. Presently, she is working as a Principal at Savitri Hospital and Paramedical Institute, School and College of Nursing, Gorakhpur, Uttar Pradesh, India.

**Arpit Ravindra Lal** is a postgraduate from SCPM College of Nursing and Paramedical Sciences, Gonda, Uttar Pradesh, India and graduate from Christian Medical Training Centre School and College of Nursing, Damoh under Dr Hari Singh Gour University, Sagar, Madhya Pradesh, India. Currently, he is working as an Assistant Professor at Savitri Hospital and Paramedical Institute, School and College of Nursing, Gorakhpur, Uttar Pradesh, India.

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