

# Instructional Manual for Nursing Skills Laboratories, Faculty of Nursing, Helwan University

## 2021-2020



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## Message from Professor Dr. Safaa Salah Ismail

### Dean of the Faculty of Nursing

بسم الله الرحمن الرحيم  
(وقل أعملوا فسيرى الله عملكم ورسوله والمؤمنون)  
صدق الله العظيم

**Dear Students**

**A heartfelt greeting ...**

It is my honor to welcome you to the Faculty of Nursing – Helwan University, and to extend to you my warmest wishes, both on my own behalf and on behalf of the esteemed faculty members and staff of the college. We sincerely wish you a bright and successful future. The Faculty of Nursing is one of the scientific and practical faculties within the university. We hope that you will be the foundation of a promising future for nursing, contributing to solving healthcare challenges—particularly since Helwan is an industrial area that is in great need of highly qualified nursing professionals capable of delivering high-quality healthcare services to patients.

The Faculty of Nursing is committed to graduating students with advanced nursing skills that enable them to perform their duties with excellence. For the educational process to be successful, it requires the combined efforts of faculty members and the supporting academic staff to serve the students. At the same time, students are expected to respect academic regulations and examination rules, actively participate in all university activities, preserve college facilities, and uphold university values and norms. There is no doubt that clinical training in the laboratories enhances students' self-confidence, improves their professional performance, and ensures the safety of both students and patients. May Allah grant you all success and guide you to what is best for your future.

**Dean of the Faculty**

**Prof. Dr. Safaa Salah Ismail**

## Introduction

The laboratories at the Faculty of Nursing constitute one of the most essential components of the faculty's infrastructure, encompassing various machines, tools, and equipment. These laboratories serve as the foundation for training and the practical application of nursing skills, aimed at fulfilling the faculty's vision and mission.

To this end, the faculty has established **ten primary nursing skills laboratories**, equipped with most of the modern tools and resources necessary to train students in the required nursing competencies to achieve the mission. Moreover, the faculty continuously updates all training aids to keep pace with the latest developments in the fields of nursing skills education and training

### **The Laboratories Committee at the Faculty aspires**

The Nursing Skills Laboratories to be a leading center in the education and training of nursing skills at the undergraduate level, effectively bridging the gap between theoretical learning and practical training

**To achieve this aspiration, the Faculty and the Laboratories Committee strive to:** Preparing nursing graduates with high competence and quality in basic and specialized nursing skills, enabling them to provide safe and effective patient care in healthcare facilities and serve the community. **Through specific objectives, which are:**

- Training on the essential nursing skills required to achieve the faculty's objectives.
  - Developing the ability to solve problems and make nursing decisions.
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- Enhancing critical thinking skills.
  - Planning and managing crisis situations.
  - Contributing to community service through continuous training and development by organizing training courses.
  - Commitment to quality standards in nursing training.
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## Duties of the Laboratories Committee

- Study of the faculty's needs for laboratories, equipment, and required medical supplies.
- Developing a general concept for the laboratories, their arrangement, interrelations, appropriate space allocation for each lab, and the necessary functional areas within them.
- Working on equipping each laboratory in a manner that suits its intended purpose and ensuring the provision of all necessary requirements.
- Preparation of an annual plan to secure the technical and training needs of the laboratories.
- Preparation of equipment specifications and laboratory unit proposals.
- Ensuring that the specifications of the equipment intended for procurement match the required standards before finalizing the purchasing process.
- Equipping laboratories with the necessary furniture and appropriate educational aids.
- Regular monitoring of equipment and laboratories within the faculty.
- Utilization of laboratory facilities for postgraduate students.
- Assessing the laboratories' needs for technicians and specialists required to organize and support laboratory operations.
- Exchange of visits with peer colleges for the purpose of sharing expertise and best practices.

## Laboratory Training Regulation

1. All students must adhere to the uniform designated by the college while inside the laboratories.
2. Personal appearance must be neat and clean, including trimmed nails
3. Wearing jewelry or accessories is not permitted, and excessive makeup is discouraged for female students.
4. Eating and drinking are strictly prohibited inside the laboratories.
5. Students must bring the required training tools, including: a personal ID card, analog wristwatch, pens of various colors, a small notebook, thermometer, scissors, and—if possible—a sphygmomanometer with stethoscope.
6. Bringing bags or personal clothing items into the laboratory is prohibited.
7. Smoking is strictly forbidden inside the laboratories.
8. Students must demonstrate good manners and respectful communication with everyone.
9. Mobile phone use is not allowed within the laboratories.
10. All tools must be kept clean and returned to their designated places after use.
11. Waste must be disposed of in the appropriate bins.
12. Students are required to follow all laboratory instructions and complete the assigned duties and tasks.
13. Proper behavior and discipline must be maintained at all times in the laboratories.
14. Punctuality is mandatory; students must attend laboratory sessions at the designated times as per the department's regulations.

## Training Stages, Laboratory Training Requirements, and Target Group

**The use of the laboratory begins from the first semester for all academic levels within the faculty.**

First Academic Year	➔	Fundamentals of Nursing Course
Second Academic Year	➔	Medical and surgical nursing
Third Academic Year	➔	Pediatric nursing and Obstetric nursing
Fourth Academic Year	➔	Community health nursing and nursing administration

- ☐ Students are divided into groups according to a weekly schedule.
- ☐ Students are subject to both practical and written examinations.
- ☐ Each student is provided with a “Checklist” to record the skills they have successfully completed.
- ☐ Various educational tools are used in the laboratory, including models, computers, role-playing, and others.



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## Training Procedure

Students receive the training program throughout the different academic levels, starting from the first year.

The following courses include practical training components:

- **Fundamentals of Nursing**
- **Medical-Surgical Nursing I & II**
- **Pediatric Nursing**
- **Obstetrics and Gynecology Nursing**

Each of these courses includes **12 hour weekly practical training**.

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### Teaching and Learning Methods Used in Laboratories

1- <b>Active Learning</b>	2- <b>Self-Directed Learning</b>	3- <b>Interactive Learning, which includes</b> (Collaborative Learning, E-learning and Brainstorming Sessions)	4- <b>Experiential Learning</b>
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### Assessment Strategies

<b>Communication Strategy</b>  It plays a crucial role in identifying the trainee's needs and planning the training program accordingly	<b>Observation Strategy</b>  This strategy involves recording the trainee's behavior and interaction with others, as well as identifying their interests and attitudes	<b>Authentic Assessment</b>  This type of assessment reflects the trainee's performance and measures their outcomes in real-life situations.	<b>Performance-Based Assessment</b>  Its effectiveness lies in methods such as progressive presentations, demonstrations, practical performance, simulations, role-playing, and discussions
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## Safety Precautions

- The laboratory should be located in a suitable area within the educational institution's building (preferably at the rear of the building) and as far as possible from the regular classrooms.
- It should be appropriately sized to accommodate the number of students engaging in laboratory activities.

## Safety and Security Equipment

- ✚ Warning Signs
- ✚ Fire Extinguishers
- ✚ Plastic Waste Containers
- ✚ Dedicated Alarm System for Each Laboratory
- ✚ A centralized alarm system with external activation buttons accessible to all staff members in the building.

## Nursing Skills Laboratories at the faculty

**First Aid Lab**

**Fundamentals of Nursing  
Labs**

**Medical-Surgical Nursing  
Labs**

**Simulation  
Laboratory**

**Obstetrics and Pediatric  
Nursing Labs**



## Database of Equipment and Devices Available in the Laboratories

### First: Contents of the Adult Health Laboratory

Category	Number
Intravenous (IV) Catheter Manikin	4
IV Fluid Stand	3
Manikin for Training on Urinary Catheterization and Enema Administration	5
Simulation Manikin (Attached to a laptop, monitor, and compressor device)	1
Wound and Injury Model	3
Arm Model for Arterial Access (Hand Arteries)	2
Arm Model for Venous Access (Hand Veins)	3
Bed sheet	33
Towels	6
Ice Bag	4
Hot Compress Bag	4
Mercury Sphygmomanometer	10
Stainless Steel Trays on Stand	7
Fuller Bed	5
Overbed Table	1
Privacy Screen	4
Kidney Basin	11
Stainless Steel Dressing Trolley	3
Small Dressing Tray	3
Digital Blood Pressure Monitor	6

<b>Sterilization Container</b>	<b>1</b>
<b>Gown</b>	<b>5</b>
<b>Suction Machine</b>	<b>2</b>
<b>Surgical Drapes</b>	<b>2</b>
<b>Cabinet</b>	<b>2</b>
<b>Filing Cabinet</b>	<b>2</b>
<b>Stethoscope</b>	<b>5</b>
<b>Thermometer</b>	<b>9</b>
<b>Waterproof Sheet</b>	<b>3</b>
<b>Surgical Towels</b>	<b>10</b>



## Second: Anatomy Laboratory Contents

Category	Number
Model of circulatory system	1
Model of nervous system	1
Model of skeletal system	1
Model of urinary system	1
Model of respiratory system	1
Model of layers of the skin	1
Model of femal genital organ	1
Model of male genital organ	1
Model of heart	1
Model of thoracic cage & pelvis	1
Model of skull	1
Model of lobes of the brain	1
Model of cervical vertebrae	1
Model of the arm (humorous bone radiaus ,ulna , carpal bone ,meta carbal bone,meta carpal bones & phalanges)	1
Cross section of kidney	1
Shoulder bone	1
Bone of foot	1





### Third: Pediatric Laboratory Contents

Category	Number
Baby incubator	1
Sim baby include the following component connected with lab top & flat screen & compressor	1
Multi venous IV arm	5
Mega code kid vital sim	2
Newborn advanced care simulator	2
Term birth of new born manikin	1
Portable suction	1
Atomizer	1
Infant scale	2
Weighting machine	1
IV stand	1
Stand with big stainless basin	3
Sphygmomanometer	20
Stethoscope	20
Movable fuller bed	1
Small baby bed	6
Areej Barf Cart	2



#### Fourth: Obstetric Laboratory Contents

Category	Number
Maternal & neonatal simulator system	1
Model of catheterization & enema training	2
Model of breast examination with 14 pieces to show breast abnormalities	2
Model of care breast palpation simulator	2
Model for abdomen for pregnant woman for abdominal examination	1
Model of cervical dilatation	1
Model of vaginal examination	1
Model for type of episiotomy	1
Model of healthy uterus	1
Model of cross section of female reproductive system	1
Model of pelvis & stand with head to determine head enlargement	1
Model of pregnancy development	1
Baby with placenta	3
Maternal & fetal birthing torso	1
External female genital organ	1
Stands with big stainless basin	4
Weighting machine	2
Sphygmomanometer	3
Stethoscope	4
Mobile Semi-Fowler Bed	3
Hydraulic Delivery Bed	1
Personal Weighing Scale	1
Areej Barf Cart	2
Areej Barf Container	2



<b>Sterilization Container – Multiple Sizes</b>	<b>3</b>
<b>Handling Forceps</b>	<b>3</b>
<b>Scissors</b>	<b>3</b>
<b>Kocher Forceps</b>	<b>4</b>
<b>Artery Forceps</b>	<b>6</b>
<b>Surgical Curette</b>	<b>2</b>
<b>Ring Forceps</b>	<b>3</b>
<b>Uterine Sound</b>	<b>2</b>
<b>Toothed Forceps</b>	<b>3</b>
<b>Plain Forceps</b>	<b>3</b>
<b>Uterine Dilators</b>	<b>3</b>
<b>Kidney basin</b>	<b>2</b>
<b>Stainless Steel Bowls</b>	<b>3</b>
<b>Sterilization Jar</b>	<b>1</b>





















## **Simulation Lab:**

### **Item (1):**

#### **Male Multi-Venous IV Training Arm Kit**

#### **Features:**

- Venipuncture possible in the antecubital fossa or dorsum of the hand
- Peripheral IV line insertion and removal
- Accessible veins include median, basilic and cephalic
- Palpable veins enable site selection and preparation



### **Item (2):**

#### **Intramuscular and Injection Hip**

#### **Features:**

- Intramuscular injection site in upper outer quadrant of gluteal region
- Intramuscular injection in ventrogluteal site below iliac crest
- Intramuscular injection in lateral thigh
- Subcutaneous injection site in lower abdominal wall above inguinal area
- Moral artery/vein site
- Controlled arterial pulse





- Place femoral line
- Hand-painted anatomic artwork of the structures of the head and shaft of the femur
- Hand-painted anatomic artwork of the sciatic nerve, major blood vessels of the region, and the deep underlying layer of muscles

### Item (5):

#### **Cricoid Stick Simulator**

- Anatomically accurate landmarks for site training.
- Interchangeable tracheas facilitate realistic simulation of needle and surgical cricothyrotomy procedures
- Replaceable neck skin with self-repairing memory allows repeated practice
- Mounted on a base



### Item (4):

#### **Interchangeable Catheterization and Enema Task Trainer**

Realistic articulation enables proper positioning for different procedures

- **Interchangeable** male and female genitalia
- Genitalia, when used with urinary connectors and reservoir, facilitate urologic care procedures such as **perineal care**, **insertion of vaginal medications** and **indwelling catheter** insertion, care, irrigation and removal
- Genitalia, when used with anal connectors and colon reservoir, facilitate **enema administration** using fluid for realistic return





**Item (5):**

- Abdominal plate with interchangeable stoma site allows simulation of  
**cystostomy tube care** and **urinary diversion stoma** care



## Trainer for wound care and bandaging techniques

### Description

- Wound after a sternotomy (with drain), center
- Wound after a thyroidectomy, center
- Wound after a mastectomy (with drain), right
- Wound after a splenectomy (with drain), left
- Wound after a thoracotomy (pneumonectomy), right
- Wound after a median laparotomy (e.g. cystectomy), center
- Wound after an appendectomy, right
- Wound after a Pfannenstiel incision (e.g. C-section or abdominal hysterectomy), center
- Wound after a laminectomy, center; rear
- Wound after a nephrectomy (side incision)
- Wound after an amputation (leg stump), left
- Colostomy
- Decubitus (grade 2), center; rear





## **Item (6):**

### **Suture Practice Arm**

- This arm is made of a soft vinyl skin over a foam allowing hundreds of suture practice sessions.
- The arm comes with 3 wounds, as well as several cuts which can be placed all over the arm, hand and fingers and sutured several times.
- The soft and pliable material guarantees the sutures will not pull out when tightened.



## **Item (7):**

### **Central Venous Cannulation Simulator**

#### **Description**

Designed for learning and practicing CVC techniques, Central Venous Cannulation Simulator is directed to the emergency medical field. ACLS and ATLS participants will find this simulator to be the ideal trainer. Anatomically accurate, palpation is exactly the same as on a patient. The sternal notch, sternocleidomastoid, clavicle, and other supporting features make this simulator a pleasure to work with. Internal features include a replaceable muscle and bone section, subclavian, internal jugular, external jugular, and carotid. Use of a Swan-Ganz catheter is possible and changing of the internal tubing is extremely easy.



### **Item (8):**

#### **Nurse Training Baby, New Born**

#### **Features:**

This advanced and incredibly realistic model with male and female features includes:

- Internal organs (heart, lung, intestine system, stomach, and bladder)
- Removable belly covering
- Interchangeable genital organs
- Soft ears
- Fully movable head, arms and legs



It allows trainees to practice both basic and medical infant care such as:

- Tracheotomy care
  - Male and female catheterization
  - Insertion of a tube into mouth or nose
  - Enema insertion
  - Femoral, gluteal intramuscular and subcutaneous injections
  - Palpitation of fontanel
-

### **Item (9):**

## **Fundus Skills and Assessment Trainer**

The Fundus Skills and Assessment Trainer features the normal anatomy of the status-post or post-partum female abdomen designed for training fundus assessment and massage skills.

### **Product benefits:**

- Educationally effective for in-hospital practice of postpartum physical assessment including identification and treatment of normal and abnormal assessment findings
- Flexible module designed for teaching:
  - Interventions for excessive postpartum bleeding including fundal massage and prevention of bladder distention
  - Accurate visual examination of postpartal blood loss
  - Perineal care including interventions for episiotomy and hemorrhoids



### **Product features:**

- Upper thighs articulate for positioning
  - Removable skin with umbilicus
  - Realistic landmark of the symphysis pubis
  - Interchangeable firm contracted and "boggy" uteri
    - Approximately a 3" diameter ball to simulate a firm, well contracted uterus
-



**Item (9):**

- Approximately a 4" diameter ball to simulate a "boggy" uterus that has not contracted
  - Fundus offset secondary to bladder distention
  - Female Genitalia
    - Elongated with swelling to the clitoral area
    - Vaginal orifice is more visible and opened
    - Labium minus more flapped to expose the vaginal canal
    - 2<sup>nd</sup>-degree midline episiotomy
    - Anal hemorrhoids visible
  - Use of peri pads and simulated blood allows for representation of blood loss after birth for practice of visual estimation skills.
-

## Baby Umbi

### **Item (10):**

Female newborn infant reproduction designed for the practice of umbilical catheterization.

- Retractable umbilical cord for actual catheterization
- Two arteries and vein molded into umbilical cord facilitate:
- Low UAC
- High UAC
- Umbilical Vein Catheter
- Securing and dressing procedures may be practiced



### **Item (11):**

## Birthing simulator basic

### **Description:**

#### **Obstetric simulation to enhance training effects:**

It was developed for the skill training in normal deliveries, in complicated deliveries and in obstetric emergencies.

Obstetric simulation has proven successful to enhance the training of delivery skills, following of protocols and reaction in emergency situation.





**Train the following delivery skills and techniques:**

- Normal vaginal delivery
  - Normal delivery of umbilical cord and placenta
  - Palpation and assessment of fetal position and presentation
  - Diagnosis of all normal and abnormal fetal positions and presentations (like face, neck, or brow) to represent routine and difficult deliveries
  - Shoulder dystocia demonstration and management
  - Breech deliveries (including complete, footling or incomplete, and frank breech presentation)
  - Palpation of fetal fontanel features
  - Complete and incomplete placenta birth
  - Demonstration of placenta previa: total, partial, and marginal
  - Prolapse of umbilical cord
  - Nuchal umbilical cord
  - Cesarean delivery through pre-cut incision
  - Clamping and cutting of umbilical cord
  - Simulated suctioning of baby's mouth and nose
  - Pindar's maneuver
  - Mauriceu –Smellie -Veit maneuver
  - Prague maneuver
  - Woods maneuver
-

## Palpation Model for Leopold's Maneuver

### Item (12):

### Description:

This model represents a female abdomen (padded cloth attached with Velcro) with a bony pelvis.

The fetus has a flexible, weighted body, movable arms and legs, firm buttocks, and a head with palpable anterior and posterior fontanelles. Movable gel packs simulate the amniotic fluid.

Abdomen can be palpated to determine **presentation and position** of the fetus as well as carrying out the Leopold's maneuver.

A unique, 3-D teaching tool, this model is perfect for performing **Leopold's maneuvers** and for demonstrating palpation of the abdomen to determine **fetal lie, presentation, and position**







### **Item (13):**

## **Resusci Junior Basic and Skill Guide**

The Resusci Junior manikin offers realistic, high-quality child CPR education.

### **Product benefits:**

- Educationally effective by focusing on the performance level of key CPR skills and techniques for children
- Enhanced student motivation through use of the optional SkillGuide indicator that allows real-time CPR performance feedback during training
- Cost efficient through easy to use and maintain disposable airways
- Realistic anatomical body and landmarks provide the essential features necessary to learn realistic child handling and quality child CPR skills
- Logistically convenient transportation provided by a durable hard case

### **Product features:**

- Natural obstruction of the airway allows students to learn the important technique of opening the airway so that in a real-life situation they know how to effectively administer air to the patient
  - Head tilt/chin lift and jaw thrust allows students to correctly practice airway maneuvers necessary when resuscitating a real child patient
  - Realistic chest rise verifies correct ventilations
  - Realistic resistance for chest compressions allows the students to experience the amount of pressure needed to perform proper chest compressions in a real-life situation
  - Anatomically correct landmarks and sternal notch allow the student to
-

practice identification of all anatomical landmarks relevant to child CPR

- Life-like size and weight of a 5-year-old child simulates the problems.
  - encountered in a real-life rescue
  - Bilateral carotid pulse simulation to realistically check for pulse
  - Disposable non-rebreathing airways are suitable for use by more than one student during class and are quick and easy to change after each training session
  - Optional SkillGuide CPR performance indicator provides immediate objective feedback on ventilation duration and volume, compression depth and hand position
  - Optional water rescue kit provides students with the chance to experience lifelike water rescue techniques required by the age group depicted by the manikin
-

### **Item (14):**

## **Nursing Anne**

### **Patient Care**

- Head with anatomical landmarks, trachea, and esophagus, along with simulated lungs and stomach, allow the practice of many procedures
- Irrigation of the eye and ear (simulated)
- Application/instillation of medications in the eye, ear and nose including nasal packing
- Mouth and denture care procedures
- Insertion and suctioning of oropharyngeal and nasopharyngeal airways
- Insertion, securing, and care of endotracheal tubes
- Tracheostomy care and tracheal suctioning
- Various oxygen delivery procedures
- NG tube insertion, care, medication administration, and removal
- Gastric lavage and gavage
- Subclavian, jejunostomy and Hickman catheter openings (placement only)
- Manually generated carotid pulse
- Deltoid, dorsogluteal, and vastus lateralis IM injections possible
- Full range of motion for realistic patient handling





- Interchangeable stomas depict colostomy, ileostomy and suprapubic cystotomy
  - Colostomy may be irrigated and will retain an indwelling catheter
  - Fingers and toes are spread to allow bandaging
- Interchangeable Male and Female Genitalia
- Complete urinary catheterization
  - Can be attached to urinary and colon reservoirs via connector valves
  - Female genitalia capable of vaginal douching
  - Will retain indwelling or straight catheter
  - Enema procedures may be performed using fluid for realistic return
  - When used with manikin, fluid may be used for realistic return
  - Urinary valves give the natural resistance felt when catheterizing
  - Anal valves simulate the internal anal sphincter
- Circulatory Skills and IV Drug Administration
- Articulating IV training arm with replaceable skin and infusible vein system allows peripheral intravenous therapy and site care
  - Venipuncture possible in the antecubital fossa and dorsum of the hand
  - Accessible veins include median, basilic and cephalic

### **Item (15):**

## **Susie® Simon® Patient Care Manikin without Ostomy**

### **Description:**

Provides practice in a wide range of skills from basic nursing through advanced nursing and clinical care.

- Fully moveable neck, arms and legs
- Soft skin of feet, fingers, and toes for added Realism.



Movable jaw with tongue

- Removable dentures
- Interchangeable external genital organs allow female and male catheterisation
- Oral, nasal, optic, tracheotomy and gastronomy openings
- Transverse colostomy stoma - ileostomy stoma - suprapubic stoma
- Detachable at waist for ease of storage

Meets all OBRA requirements Supplied with neck brace

### Item (16):

## Noelle® Birthing Simulator with birthing baby

### Description:



The NOELLE™ birthing simulator features:

- Replaceable dilating cervixes
  - One articulating birthing baby with placenta
  - Full size articulating female
  - Intubatable airway with chest rise
  - IV arm for meds/fluids
  - Removable stomach cover
  - Practice Leopold Maneuvers
  - Multiple fetal heart sounds
  - Automatic birthing system
  - Measure head descent and cervical dilation
  - Multiple placenta locations
-

## **Item (17):**

### **MegaCode Kelly with SimPad™**

Educationally Effective, Flexible  
Clinical Skills Trainer

A full-body manikin designed for the practice of advanced, difficult and obstructed airway scenarios and IV therapy. Mega Code Kelly with SimPad PLUS allows cardiac defibrillation, pacing and ECG interpretation of over 1000 rhythm variations.



Building Competencies  
Improving Patient Safety

The challenge to deliver continuous and consistent quality patient care requires proper training, accurate assessments, interventions and clinical decision making skills to ensure the best patient outcomes.

### **Item (18):**

## **Clinical Chloe Advanced Patient Care Simulator**

### **Description:**

- Soft, lifelike face skin
- Stylish wig
- Eyes in eye sockets for ophthalmic exercises
- Movable jaw
- Ear canal for otic drops and irrigation
- Pass NP and OP tubes
- Bends at waist as in human
- Jointed elbows, wrists, knees, and ankles
- Detachable at waist for easy storage
- 360° intramuscular and subcutaneous injection sites in upper arms
- Intramuscular injection site in buttock
- Interchangeable male and female breasts (left breast contains malignancy)
- Interchangeable male genitalia
- Tricuspid valve permits male or female catheterization with soft silicone catheters
- Practice transverse colostomy, ileostomy, and suprapubic procedures using quality internal, removable tanks
- Enema administration





**Item (18):**

- Vaginal douching and pap smear exercise with realistic vagina and cervix
  - Two spare bladder tanks
  - Advanced training arm and hand for IV, IM, and sub-Q techniques
  - Instruction manual
  - Student transcripts in SimManager
-