Adult Multi-Difficulty Adjustable Airway Management Training Model

User Manual

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1 Product Overview

This product is a multi-difficulty adjustable airway management training model based on the Cormack-Lehane (C-L) classification, suitable for airway management skill training of medical personnel in medical schools, hospital residency programs, and emergency training institutions worldwide. It can accurately replicate real clinical scenarios such as normal airways, mild-to-moderate difficult airways, severe difficult airways, and cervical spine entrapment. Integrating high-fidelity anatomical structures and specialized functional accessories, the model helps trainees master standardized skills including airway opening, intubation, suctioning, and emergency management, adapting to training needs in different countries and regions.

2 Package Contents

1. Model Main Body × 1
2. Left Lung × 1
3. Right Lung × 1
4. Stomach × 1
5. Base × 1
6. 30mL Luer Lock Syringes × 2
7. Suction Bags × 2
8. User Manual × 1
9. Certificate of Conformity × 1

3 Core Functions

1. **High-Fidelity Anatomical Structures**:
    - Oral Cavity: Reproduces core clinical operation structures such as epiglottis, vocal cords, and uvula, with a feel close to human tissues.
    - Nasal Cavity: Equipped with superior, middle, and inferior turbinates and complete nasal passages, suitable for nasal intubation training.
    - Includes cricoid cartilage structure, supporting Sellick maneuver (cricoid pressure) practice.
2. **Airway Operation Compatibility**:
    - Supports OPA (Oropharyngeal Airway) and NPA (Nasopharyngeal Airway) intubation training.
    - Compatible with mainstream medical equipment such as video laryngoscopes and endoscopes, enabling clear observation of internal simulated structures.
    - Supports bag-valve-mask ventilation, face mask ventilation, and artificial respiration training.

2. **Model Details**:
    - The head supports near-human range of motion including flexion, extension, and left-right rotation, with operating resistance simulating real human touch.
    - Three cervical spine state simulations: Normal Head Extension (0°~60°), Restricted Head Extension (0°~15°), and Over-extension Entrapment, accurately replicating clinical states such as cervical rigidity and trauma.
    - Palate Force Feedback: Triggers a "click" prompt when excessive force is applied, standardizing laryngoscope operation force and avoiding violent operation habits in clinical practice.
    - Visual Lung Ventilation: Both lungs inflate synchronously after successful intubation, intuitively verifying the correctness of the operation.
3. **Advanced Scenario Simulation**:
    - C-L Classification Linked Adjustment: Covers C-L Grade Ⅰ~Ⅳ airway scenarios, reproducing difficult airways caused by single or multiple overlapping factors.
    - Graded Tongue Edema Simulation: Adjusts swelling degree (mild/moderate/severe) via syringe inflation, replicating different levels of visual field obstruction.
    - Glottic Stenosis + Laryngospasm Simulation: Adjusts glottic stenosis via airbag, supporting periodic inflation/deflation to simulate acute laryngospasm scenarios.
4. **Specialized Suction Training Accessories**:
    - Equipped with 2 suction bags of the same specification (heat-sealed process with PVC connectors), which can be directly sleeved on the tracheal interface to replace lung models for suction training, avoiding contamination of lung components and enabling convenient cleaning.
5. **Practical Auxiliary Functions**:
    - Vomiting Simulation Function: Squeezing the stomach area after filling with simulated vomitus achieves vomiting effect, suitable for emergency scenario training.
    - Quick-Release + Storage Optimization: Lungs, stomach, and suction bags all support quick-release structures for easy cleaning and disinfection; the lung bracket features a magnetic folding design, allowing the model to be displayed upright after disassembly with a small storage volume.
    - Base Function: Supports slight shoulder elevation to facilitate neck padding for head lifting, adapting to clinical airway opening position adjustment.

4 Assembly Steps

(The model main body is pre-assembled; do not disassemble internal structures by yourself to avoid damaging core components)

4.1 Component Assembly (Scenario-Based Selection to Adapt to Different Training Needs)

4.1.1 Respiratory Training Assembly

1. Take out the left and right lungs, connect them to the distal end of the model's airway passage via quick-release connectors respectively, ensuring a tight connection without air leakage;
2. Connect the stomach to the corresponding passage interface of the model main body via the quick-release structure;
3. Unfold the magnetic bracket on the model's shoulder, and fix the left and right lungs on the corresponding positions of the bracket by magnetic attraction, ensuring the lungs are exposed for easy observation of ventilation effects.

4.1.2 Suction Training Assembly

1. If lung components are already installed, remove the left and right lungs first;
2. Take out the suction bag and fill it with simulated sputum;
3. Directly sleeve the connector of the suction bag on the tracheal passage interface of the model main body (completely replacing the left and right lungs), ensuring the interface is tightly sleeved without loosening;
4. Connect the stomach to the corresponding passage interface of the model main body via the quick-release structure to prevent sputum from flowing out of the esophagus;
5. Start your training.

4.2 Base and Accessory Connection

1. Place the model main body stably on the base to complete positioning and fixing, ensuring the model is not easy to tip over;
2. The bottom of the model main body is connected to the base via a spring buckle + cylindrical shaft quick-release structure. During installation, align the cylindrical shaft at the bottom of the main body with the opening of the spring buckle on the base, press the main body downwards until the cylindrical shaft is embedded in the arc-shaped slot of the buckle, and a "click" sound indicates successful fixing. Test whether the main body is stable; during disassembly, lift the model main body upwards along the opening direction of the spring buckle, and the cylindrical shaft will break away from the slot against the spring tension to quickly separate the main body from the base;
3. Connect the 30mL Luer Lock Syringes to the tongue and glottic Luer connectors respectively: The white switch (marked "Glottis") is the glottis opening control module, and the blue switch (marked "Tongue") is the tongue swelling control module (Valve operation: Parallel to the connector direction is open, perpendicular to the connector direction is closed).

5 Product Operation Instructions

5.0 Basic Airway Intubation Operation Process

This process only describes the model's usage steps and does not involve clinical diagnosis and treatment specifications. Users must follow the medical guidelines of their respective countries/regions for actual clinical operations:

1. Preparation: Confirm the model is placed stably, and all quick-release connectors and pipelines are free of damage; select respiratory components (lungs) or suction components (suction bags) according to training needs and complete assembly;
2. Cervical Spine State Setting: Adjust the cervical spine to the required training state (normal/restricted) via the cervical rebound device button (see 5.1 for detailed operation);
3. C-L Classification Scenario Configuration: Operate the Luer Lock valve to adjust the degree of tongue edema and glottic stenosis (see 5.2 for detailed operation);
4. Intubation Operation: Select the oral or nasal route according to training needs, and use auxiliary tools such as laryngoscopes and stylets for intubation, simulating clinical operation techniques;
5. Effect Verification:
    - Respiratory Training Scenario: After intubation, ventilate via a bag-valve-mask and observe whether both lungs inflate synchronously to verify the correctness of the intubation position;
    - Suction Training Scenario: After confirming the intubation position is correct, connect the suction equipment to carry out suction operation training.

5.1 Cervical Spine State Switching

Touch and press the rebound device's button through the silicone skin at the junction of the head and neck to switch between three states, with intuitive and unambiguous operation:

- **Normal Head Extension State**: Press the button until it retracts and locks; the head can freely extend to 60° and support left-right rotation, simulating the normal range of human cervical spine movement;
- **Restricted Head Extension State**: Press the button again until it pops out and locks; the maximum head extension angle is limited to 15°, simulating clinical scenarios such as cervical rigidity and post-traumatic restricted movement;
- **Over-extension Entrapment State**: Forcibly lifting the head in the restricted state will cause the limit block on the skull to snap into the groove formed by the two transverse protrusions of the self-locking pin, resulting in the head being locked in the over-limit position and unable to continue flexing, extending, or returning to the original position independently; to release the entrapment, gently adjust the head posture (such as slight lateral deviation or small downward flexion), and the guide chamfer on the upper edge of the limit block will guide it to slide out of the groove along the inclined surface of the protrusion. After unlocking, the head can return to the restricted state or neutral position, accurately simulating the real clinical scenario of cervical spine entrapment and unlocking after forced movement.

5.2 C-L Classification Scenarios (Recommended Settings)

Use the accompanying 30mL Luer Lock Syringe for inflation. The inflation volume of a single airbag shall not exceed 30mL to avoid damaging the adjustment module; each classification requires coordinated operation of the Luer Lock valve to ensure stable state:

- **C-L Grade Ⅰ (Normal Airway)**: Normal head extension + tongue not inflated + glottis not inflated; glottis can be directly exposed;
    - Valve Operation: Keep the Luer Lock valves corresponding to the tongue and glottis closed to ensure no air leakage from the airbags;
- **C-L Grade Ⅱ (Partial Glottic Exposure)**: Normal head extension + tongue slightly inflated (≤10mL) + glottis slightly inflated (≤10mL); partial glottis exposure requires adjusting the laryngoscope angle;
    - Valve Operation: ① Rotate the corresponding valve counterclockwise to open the air circuit; ② Inject the specified volume of air with a syringe; ③ Rotate the valve clockwise to close the air circuit and maintain the current edema/stenosis state;
- **C-L Grade Ⅲ (Only Epiglottis Visible)**: Normal head extension + tongue moderately inflated (15~20mL) + glottis moderately inflated (15~20mL); intubation requires guidance with auxiliary tools such as stylets and video laryngoscopes;
    - Valve Operation: Same as C-L Grade Ⅱ, adjust the inflation volume as needed, and close the valve to maintain the state after inflation;
- **C-L Grade Ⅳ (Severe Difficult Airway)**: Restricted head extension + tongue maximally inflated (≤30mL) + glottis maximally inflated (≤30mL); requires simulating emergency airway establishment operations (such as cricothyrotomy guidance);
    - Valve Operation: Same as the above steps, ensure the inflation volume does not exceed the 30mL limit, and start training after closing the valve.

5.3 Laryngospasm Emergency Training

Based on the recommended settings of C-L Grade Ⅱ or Ⅲ, open the glottis opening control module valve (rotate counterclockwise), and control the inflation/deflation rhythm by manually intermittently pinching and releasing the syringe plunger (such as inflation for 3s → deflation for 2s), making the glottis present periodic stenosis-opening with airbag inflation-contraction; trainees need to quickly complete intubation during the short open window of the glottis, simulating emergency management of acute clinical laryngospasm and improving operation speed and on-site response capabilities.

5.4 Vomiting Function Simulation

1. Confirm the stomach quick-release connector is tightly connected and the passage is unobstructed;
2. Inject simulated vomitus (such as diluted starch solution, special simulated body fluid) into the stomach;

3. Gently press the stomach area to simulate the vomiting reflex. After training, promptly disassemble the stomach, rinse the internal passage with clean water, and store it after drying.

5.5 Suction Training Operation

1. According to the "4.1.2 Suction Training Assembly" steps, connect the suction bag to the tracheal passage instead of the lungs;
2. After completing airway intubation, connect the suction equipment connector to the corresponding interface of the suction bag;
3. Conduct suction operation training to simulate the airway secretion clearance process;
4. After training, disassemble the suction bag, rinse the interior with clean water, disinfect it, and dry it for later use to avoid cross-contamination.

6 Precautions

1. This model does not support cricothyrotomy. For practicing this operation, it is recommended to purchase relevant products from our company;
2. When operating tools such as laryngoscopes and tongue depressors, take the "click" prompt from the palate as the force limit to avoid damage to the palate components or teeth caused by violent pressing;
3. Do not forcibly lift the head when the cervical spine is in a restricted state. Do not use violent reset after entrapment; unlock by gently adjusting the posture in accordance with specifications to prevent damage to the cervical spine adjustment unit;
4. Only use the accompanying 30mL Luer Lock Syringe for inflation. The inflation volume of a single airbag shall not exceed 30mL, otherwise it may cause airbag rupture or adjustment module failure;
5. For suction training, must use specialized suction bags instead of lung models. It is prohibited to directly use lung models for suction operations to avoid contamination of the internal structure of the lungs, which is difficult to clean;
6. Do not pull the silicone skin of the head forcefully to avoid silicone damage affecting cervical spine state adjustment and appearance integrity;
7. Promptly clean the stomach and model's oral cavity after vomiting simulation to avoid residual simulated substances corroding the internal passage or breeding bacteria;

   Avoid over-squeezing the bag-valve-mask during ventilation to prevent damage to lung components due to excessive pressure;
9. Non-professional maintenance personnel shall not disassemble the internal core components of the model main body (such as rebound devices, force feedback structures, airbags). For maintenance, please contact the supplier;
10. This product is only for teaching and training, not for clinical medical use or human experiments. When using, please comply with the safety use specifications of the region.

7 Product Maintenance and Storage

7.1 Cleaning and Maintenance

1. Disassemble the left lung, right lung, stomach, suction bags, and syringes, rinse the surface and internal passages with clean water to remove residual stains; the suction bags and stomach can be rinsed internally with a water pipe to ensure thorough cleaning; handle in accordance with local medical consumable disinfection standards, and store after disinfection and drying to avoid disinfectant residue;
2. The silicone components of the model are made of silicone material. A small amount of silicone oil may precipitate during long-term storage. The silicone oil is a safe component, non-toxic and harmless to the human body, and does not affect product use and training safety;
3. Use mild cleaning media for cleaning. It is recommended to use pure water or medical mild detergents that meet international standards. It is strictly prohibited to use corrosive liquids such as strong acids, strong alkalis, alcohol (concentration >75%), and acetone to avoid damaging the silicone surface and internal components;
4. After cleaning, thoroughly dry all components (especially silicone areas, airbags, and pipelines), which can be air-dried naturally or wiped dry with a clean soft cloth. It is strictly prohibited to expose to direct sunlight or high-temperature drying (temperature >60℃) to prevent silicone aging, deformation, or airbag damage;
5. After cleaning and drying, a small amount of medical-grade talcum powder can be evenly applied to the surface of silicone materials (such as the inner wall of the oral and nasal cavities, and the silicone skin of the head) to form a protective layer, reduce silicone adhesion and aging, and extend service life.

7.2 Storage Steps

1. Release the gas in the tongue and glottic airbags (open the valve counterclockwise to deflate), and close the valve after deflation to restore each component to its initial state;
2. Disassemble the left lung, right lung, stomach, and suction bags, and fold the shoulder magnetic bracket into the shoulder shell cavity;
3. Classify and place the model main body and all accessories in a dedicated storage space to avoid squeezing silicone structures, airbags, and lung components, preventing deformation and damage;
4. The storage environment should be dry and well-ventilated, avoiding direct sunlight or high-temperature and high-humidity environments to extend the product service life.

8 Troubleshooting

Fault Phenomenon	Troubleshooting Method
Airbag cannot maintain pressure after inflation	Check if the Luer Lock valve is fully closed (tighten clockwise); inspect the connection between the airbag and the inflation tube for air leakage, reconnect if necessary
No audible feedback from palate force	Adjust the laryngoscope pressing angle to ensure alignment between the palate protrusion and the sound piece; clean stains or foreign objects on the surface of the sound piece to avoid obstruction
Lungs do not inflate after ventilation	Check if the airway passage is unobstructed (no foreign object blockage); verify that the lung quick-release connector is tightly connected, reinsert to confirm
Cervical spine state cannot be switched	Confirm if the rebound device button is fully pressed through the silicone skin; clean foreign objects around the self-locking pin to ensure smooth axial movement
No vomiting effect	Check if the stomach passage is unobstructed (no blockage); confirm the stomach is filled with sufficient simulated substances and the pressing force is moderate (avoid being too light or too heavy)
Unobstructed passage after suction bag connection	Check if the connector is fully sleeved on the tracheal interface; clean foreign objects in the internal passage of the suction bag to ensure no blockage
Luer Lock connector leaks air	Check if the connector is properly connected; if the connector sealing ring is damaged, contact the supplier to replace the matching sealing ring

Note: All components of this product comply with international safety standards for medical training equipment and are universally applicable worldwide. For technical support or accessory replacement, please contact the product supplier.