Chartered Institute of Ergonomics & Human Factors

The essential considerations: Human Factors and Usability Testing during the Rapid Manufacture of Ventilator Systems

There are four Human Factors issues to consider throughout the design process:

1. Users

Understand the capabilities and limitations of the novice and experienced users.

- Who will be using the new ventilators?
- What training will be given (detail and duration)?
- What level of PPE will users be wearing?

Speak to experts, manufacturers and users of existing systems.

2. Environment

Think about where the ventilators will be used.

- What will the lighting level be?
- How should effective alarms be designed (audio/visual)?
- Are there designated spaces for the ventilators?

Review spatial layouts (Health Building Notes) and environmental design (Health Technical Memoranda) e.g. Field and Nightingale hospitals.

3. Tasks

Identify the tasks for these minimally clinically acceptable ventilators.

- What do your users need to do with the ventilator?
- How easy is it to set up?
- Are the steps clear for:
  - Initial set up and checks
  - Initiation of mechanical ventilation
  - Reacting to sudden changes in status.

Create a thorough task analysis with usability experts and real end-users.

4. Risks

Predict the hazards to users and patients.

- How can a user or patient be harmed?
- Can the users read, interpret, monitor and adjust the settings at all times?
- How does the ventilator design prevent hazards from happening?

Perform a thorough use related risk assessment.

These will influence:

Instructions for use

Alert users to the correct and safe use of the ventilator.

- Use the task analysis to ensure procedures are written clearly, step-by-step.
- Text should be easily understood, in plain language with a consistent use of colours.

Instructions for use should be tested during the ventilator design with high risk steps clearly marked.

Ventilator user interface

Design a good and intuitive user interface by understanding user requirements.

- Try to align new ventilator designs to existing designs to reduce use errors.
- Design the ventilator for using whilst wearing Covid-19 PPE.
- From the risk assessment identify critical information to display on the ventilator to alert the user.

Use CIEHF usability protocol to test in line with MHRA RMVS001.

Training

Build competence and confidence in the ventilator.

- Training based on a thorough task analysis will be consistent.
- A training protocol will help ensure all users are adequately trained.
- Training consistency is critical if training is used to mitigate risks.

The training, instruction for use and user interface must convey consistent information to the user on safe and effective use of the ventilator.

The CIEHF has all the guidance you need to expedite your design process.

Contact us or download our FREE guides.

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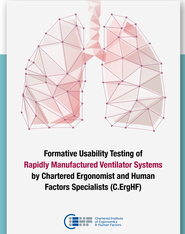

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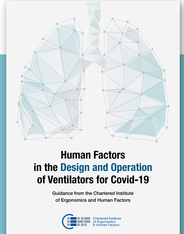

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