4 International Clinical Engineering & Health Technology Management Congress

October 24-26, 2021 - Virtual Edition

Development and Evaluation of Medical AR Support System for Life Support Equipment

Ryosuke Kasai

Tokyo university of Technology @ Japan

IFMBE Clinical Engineering Division

GLOBAL CLINICAL ENGINEERING ALLIANCE

AAMI

The Team / Workgroup

★**Ryosuke Kasai**

Clinical engineer

Tokyo University of Technology

Tetsuya Shimamine

Clinical engineer

Tokyo University of Technology

Fuminori Kamijo

Clinical engineer

Tokyo University of Technology

Takashi Kano

Clinical engineer

Tokyo University of Technology

Minoru Ogino

Clinical engineer

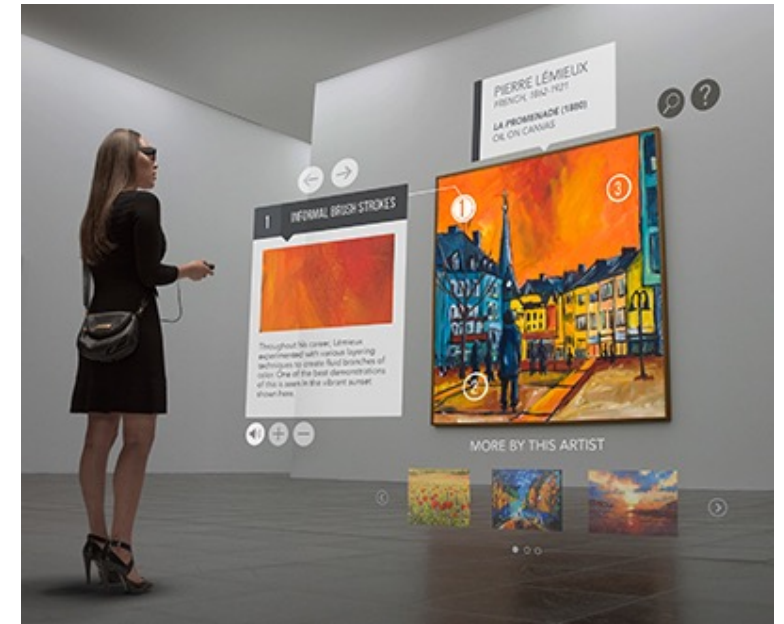Tokyo University of Technology

Kazuhiko Shinohara

Doctor of Medicine/surgeon

Tokyo University of Technology

Kohei Tanaka

Clinical engineer

Tokyo University of Technology

Event Website: https://www.globalcea.org/icehtmc

IFMBE Clinical Engineering Division

GLOBAL CLINICAL ENGINEERING ALLIANCE

AAMI

Description

Medical needs

➡️ **Medical safety**

particularly, the perceived necessity for countermeasures to prevent medical accidents arising from human error

Development

➡️ "Medical Augmented Reality Support System" **(MARSS)**

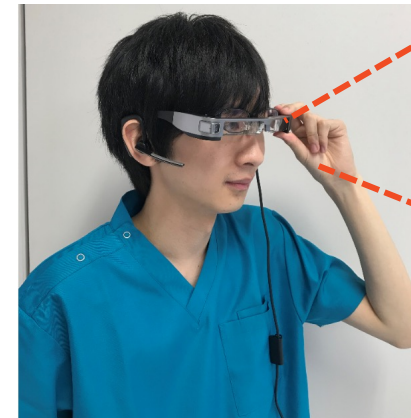Developed for medical accident prevention and efficient training

Guidlines

① Does not depend on **human memory**
② Work in a **hands-free** without interruption
③ **Promptly provide information** to users

MOVERIO BT-300
(EPSON)

Operation by voice

Voice guidance

VOYAGER LEGEND
(Plantronics)

*A translucent screen is displayed
*Work while checking the displayed work manual

★ **Accordingly, we have developed MARSS contents for the operation of cardiopulmonary bypass machine(CBM). We evaluated the effectiveness of the learning efficiency and operational accuracy of MARSS.**

Methods：Subject and Manual
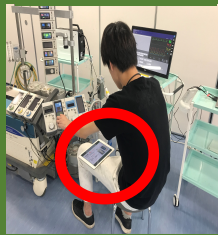
★The subjects comprised 15 healthy adults.

★ The subject **operated the CBM while looking at the manual**. Then, according to the type of the manual used, subjects were divided into three groups: the "**paper group**(n=5)", the "**tablet group**(n=5)", and the "**MARSS group**(n=5)".
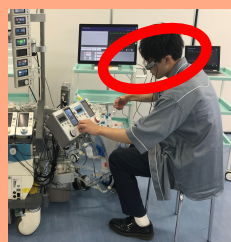
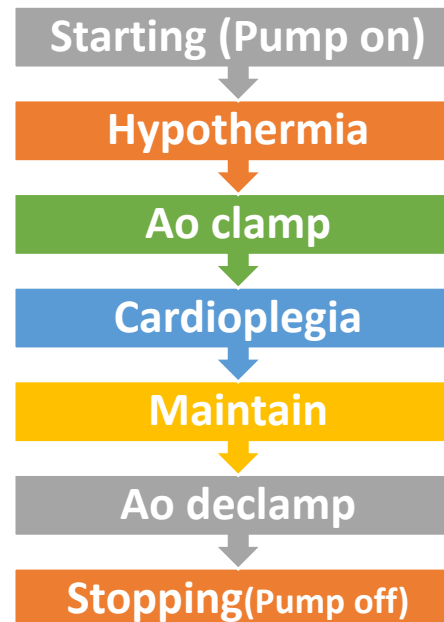**Paper group N=5**

Paper based

Tablet group N=5

Tablet based

MARSS group N=5

MARSS based

★ CBM: HAS Ⅱ (MERA, Japan)

★ Training simulator PIT-2 (JMS, Japan)

★ Operation protocol

Starting (Pump on)
↓
Hypothermia
↓
Ao clamp
↓
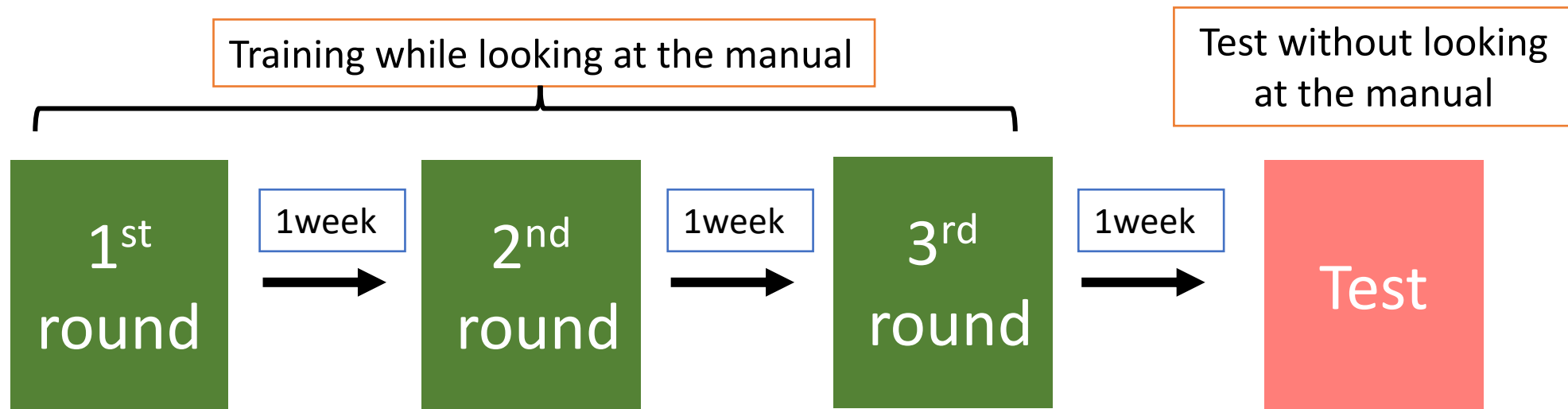Cardioplegia
↓
Maintain
↓
Ao declamp
↓
Stopping(Pump off)

★ Evaluation items

「**Operational score (O score)**」

"Operational score" referred to the score for the procedure. **The higher the score, the more accurately the operation was performed**.

「**Technical score(T score)**」

"Technical score" targeted the operation of the reservoir liquid level, which is one of the operational techniques of the CBM. It is taken as the difference between the upper and lower limits of the reservoir liquid level, and **a lower score indicated a better operational technique**.
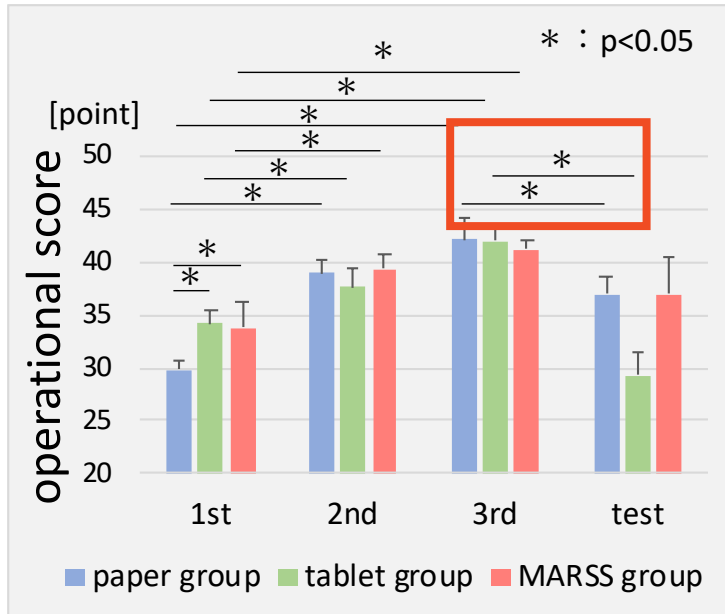
IFMBE Clinical Engineering Division

GLOBAL CLINICAL ENGINEERING ALLIANCE

AAMI

Methods：Experriment schedule

★ The experiment schedule involved the subjects operating the CBM in three rounds, once every other week, with each group **looking at the manual** as a training tool .
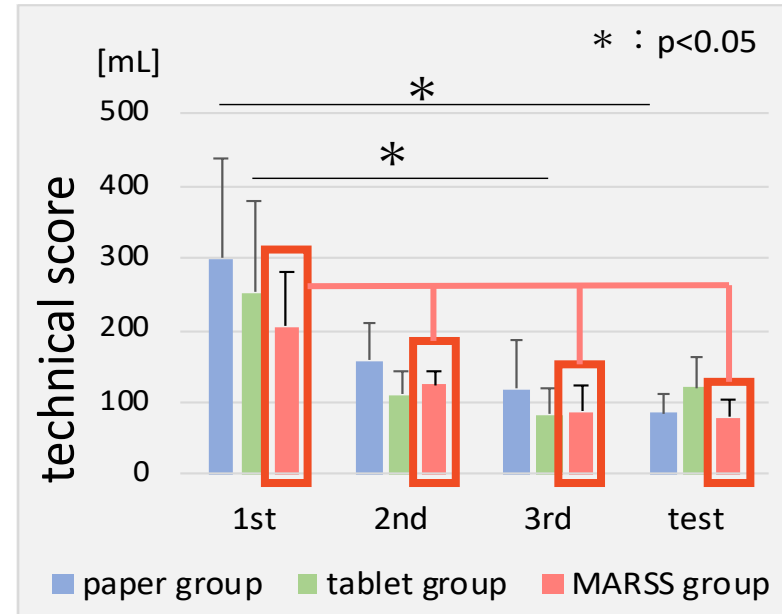★ In addition, a week after the third round, they operated the CBM as a test, **without looking at the manual**.

Training while looking at the manual

Test without looking at the manual

| 1st round | 1week | 2nd round | 1week | 3rd round | 1week | Test |

Results and analysis

O score

T score

・It can be considered that MARSS did not interfere with the flow of work, and that it was possible to input information visually and aurally, with information being well retained.
Hence, the performance of the MARSS group did not deteriorate at the time of the test.

・It can be considered that Among the MARSS group it is possible to have the manual and the reservoir port in simultaneous view without removing one's gaze during task execution. Further, it became possible to check the manual while continuing to adjust the liquid level operation of the reservoir port, and it was considered that the variation of the liquid level fluctuation was reduced.

Goals of the project and final users that will benefit

two unique characteristics in MARSS

①the effect of embedding memories

②the effect of reducing variation in the accuracy of operation

★The utilization of MARSS is expected to lead to a reduction in medical accidents caused by human error. In addition, the effects of reducing variations in the error rate and establishing memory by providing information via both visual and audio means are considered to be highly beneficial for training.

final users that will benefit

We believe that doctors, nurses, clinical engineers, and other medical professionals can contribute to improving medical safety and improving the efficiency of education by MARSS.

IFMBE Clinical Engineering Division

GLOBAL CLINICAL ENGINEERING ALLIANCE

AAMI