KSN 2019
Seoul, Korea · May 23 - 26

**Abstract Type : Poster**
**Abstract Submission No. : PO-1607**

# CUSTOM-MADE DOPPLER ULTRASOUND FLOW SIMULATOR FOR DIALYSIS ACCESS USING CONTINUOUS RENAL REPLACEMENT THERAPY MACHINE

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**Objectives:** The purpose of this paper was to introduce an easy and inexpensive way of making a simulator for training in Doppler ultrasound flow rate measurement using a continuous renal replacement therapy (CRRT) machine and home-made phantoms.

**Methods:** A Doppler ultrasound flow simulator was made using a CRRT machine and vascular phantoms for flow rate assessment of dialysis access with readily accessible components including rubber tube, keyboard cleaning gel, and freeze-dried instant coffee granules.

**Results:** The trainees can perform Doppler ultrasound examination on the vascular phantom, experience the flow volume measurement, and understand the basic Doppler principles using the simulator.

**Conclusions:** The simulator is an affordable and easy method of DU flow rate measurement training for dialysis staff using materials readily available in dialysis centers.

Figure 1. Construction of the Doppler ultrasound flow simulator

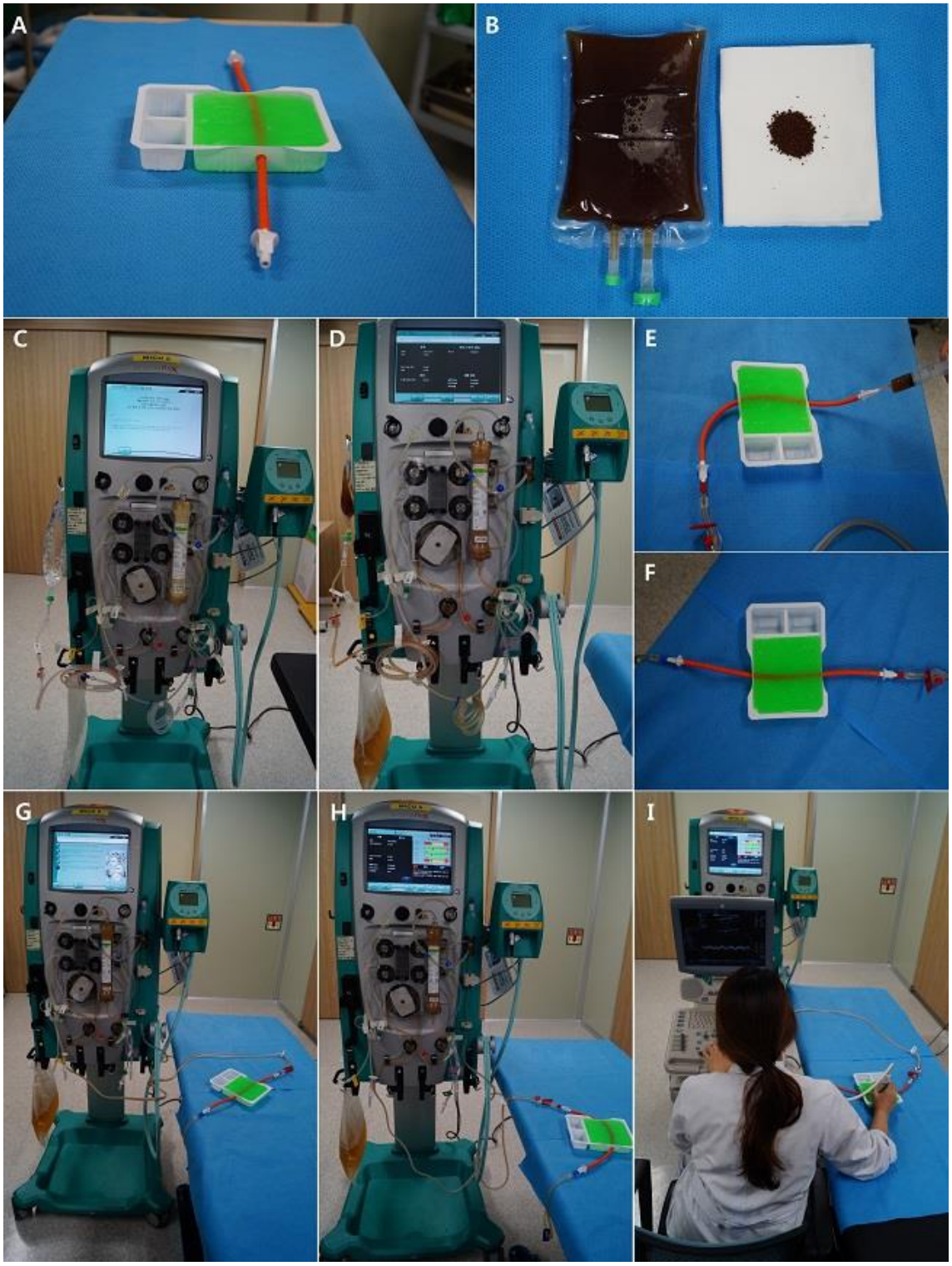
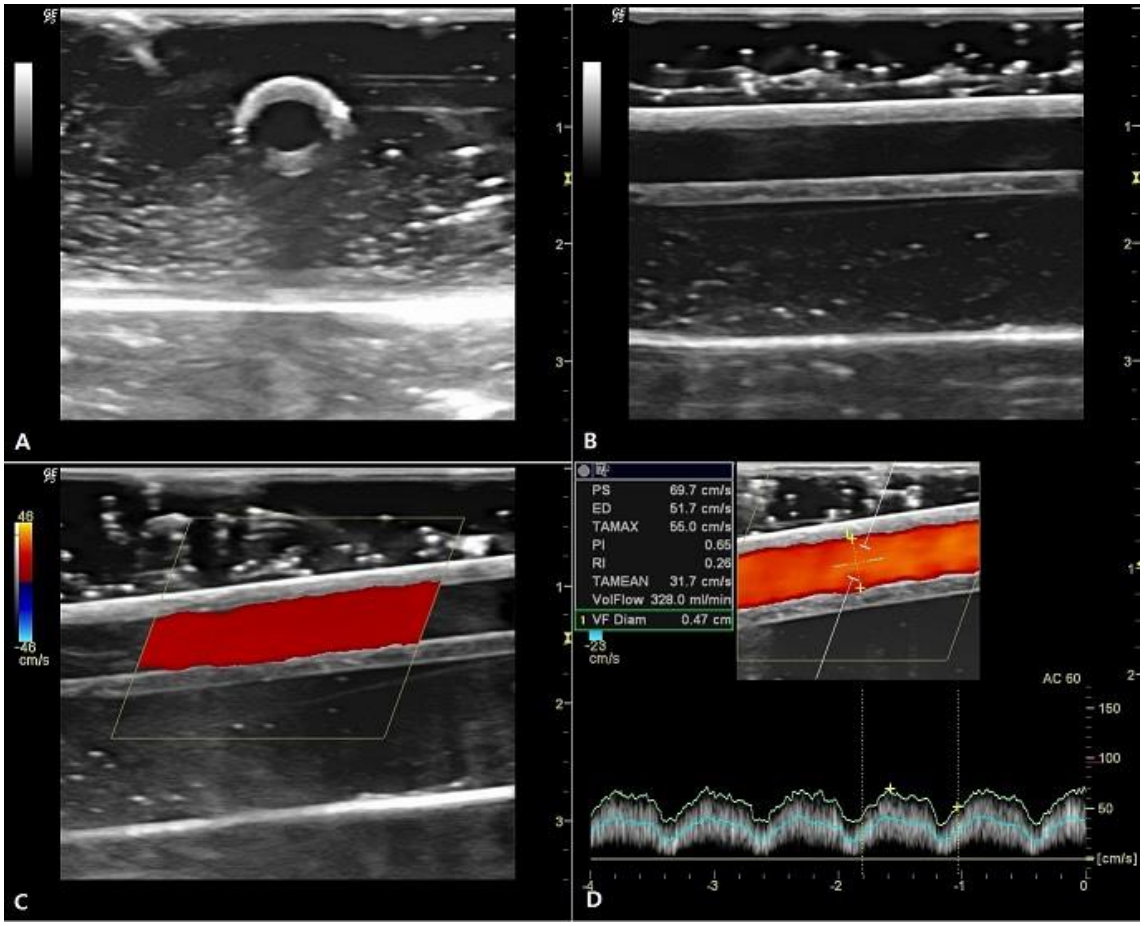



Figure 2. Ultrasound images of the vascular phantom


A
B
C
D
48
-46
cm/s
PS 69.7 cm/s
ED 51.7 cm/s
TAMAX 55.0 cm/s
PI 0.65
RI 0.28
TAMEAN 31.7 cm/s
VolFlow 328.0 ml/min
1 VF Diam 0.47 cm
-23
cm/s
AC 60
150
100
50
[cm/s]
-4
-3
-2
-1
0