중환자 고압산소치료 Critical care in HBOT

Korean Academy of
Undersea and Hyperbaric Medicine

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이 름 : 이 윤 석 임상조교수

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Goal

Ⅰ 고압환경이 중증환자에게 미치는 생리적 영향에 대한 이해

Ⅱ 중증환자에서의 고압산소치료 적응질환 설명

Ⅲ 중증환자의 고압산소치료 시 필요한 준비사항에 대한 이해

Ⅳ 중증환자의 고압산소치료 시 주의사항에 대한 이해

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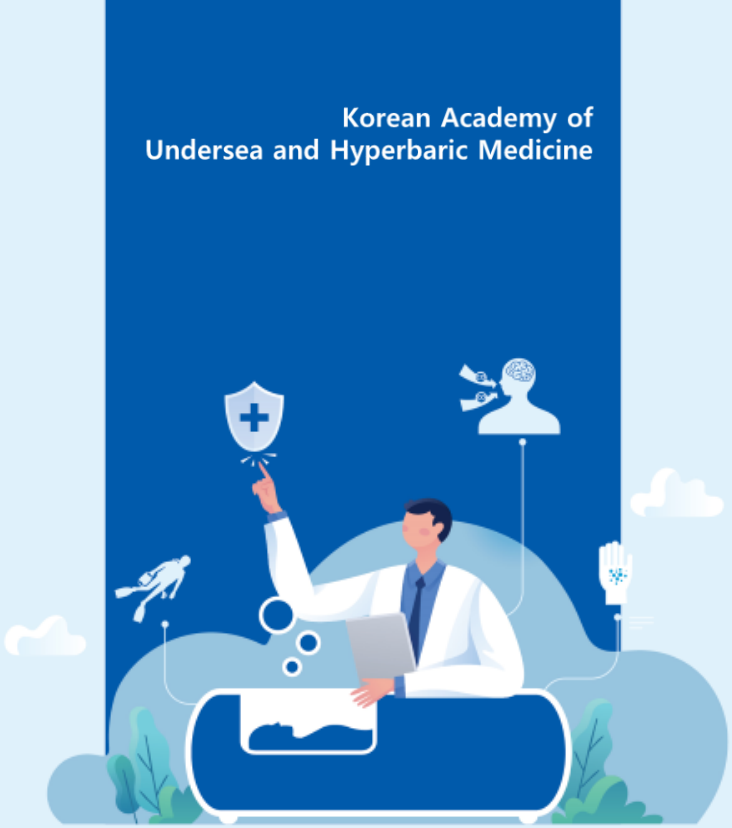
고압환경에서의 중환자치료



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PAST 1987 – 2015.10

경축
국기지정
권
Emergency Center

2015.10-2018.10

2018.10 ~

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Camera 01

1
2
원주세브란스기독병원
WONJU SEVERANCE CHRISTIAN HOSPITAL
ibex
MEDICAL SYSTEMS

Acute critical in HBOT

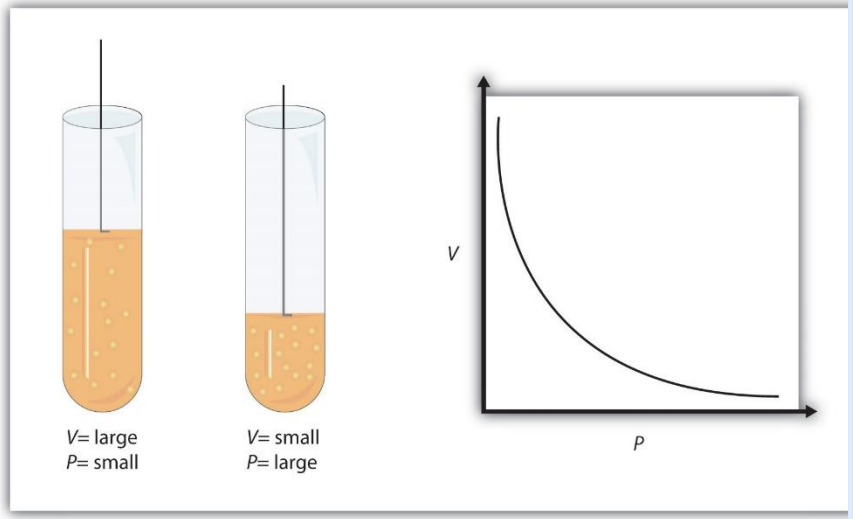
- CO poisoning
- Cerebral Arterial Gas Embolism
- Intubated patients having wound problem

Critical Care in ER (1 ATM)

How to do in here?

Gas laws

- Boyle's law
  - Pressure increases
  - Volume decreases

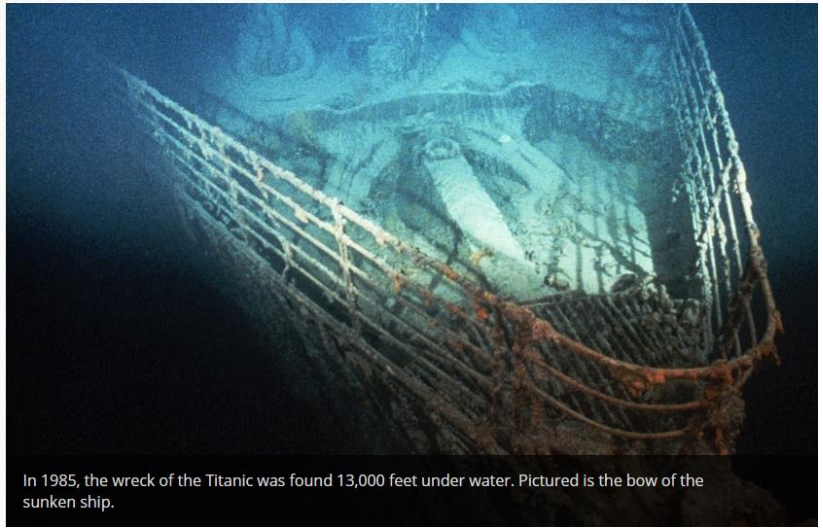


$P_1V_1 = P_2V_2$

On descent, barotrauma can occur (middle ear squeeze, sinus squeeze, tooth squeeze)

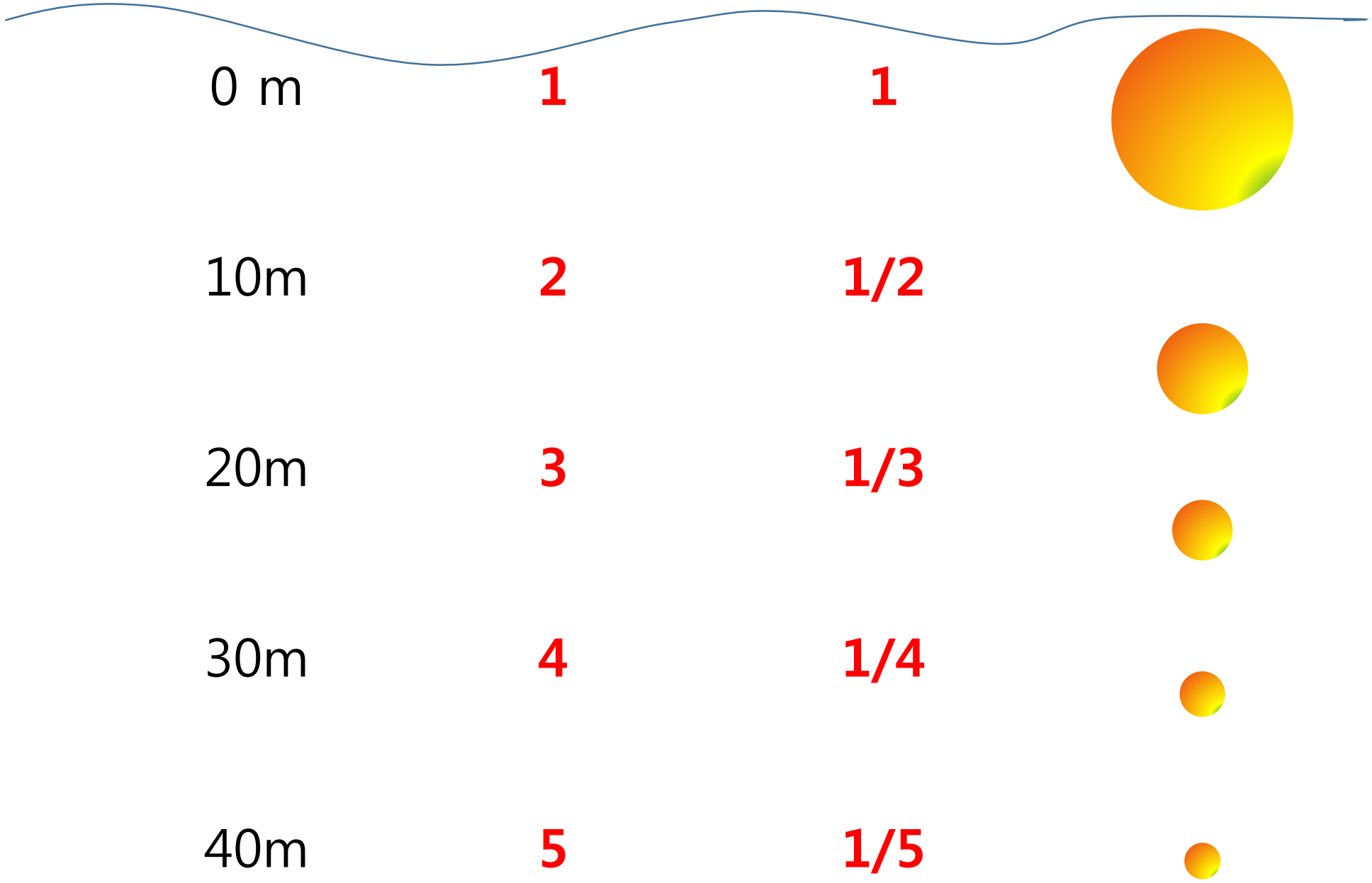
On ascent, barotrauma can occur (middle ear block, sinus block, GI gas expansion, pulmonary over-pressure accidents)

Titanic: Before and After (15)



In 1985, the wreck of the Titanic was found 13,000 feet under water. Pictured is the bow of the sunken ship.

Depth	ATA	Air Volume
0 m	**1**	**1**
10m	**2**	**1/2**
20m	**3**	**1/3**
30m	**4**	**1/4**
40m	**5**	**1/5**



Patient Assessment

Fundamental Things (A-B-C)

- Airway, Breathing, Circulation, …

Past Medical History (PHx)

- Medical devices: **pacemaker, ICD, insulin pump**, …
- HTN, DM, …
- **Cardiovascular disease**: heart failure, coronary artery disease, …
- **Pulmonary disease**: COPD, asthma, **pneumothorax**, …
- **Psychiatric disease**: anxiety disorder, psychotic disorder, …
- **Ophthalmologic disease**: glaucoma, …
- **Infectious disease**: contagious, multidrug resistant

Patient Assessment

Vital sign (BP, HR, RR, BT)

Chest X-ray

Position/ambulatory status (Advanced airway)

HBOT 진행 여부 결정

→

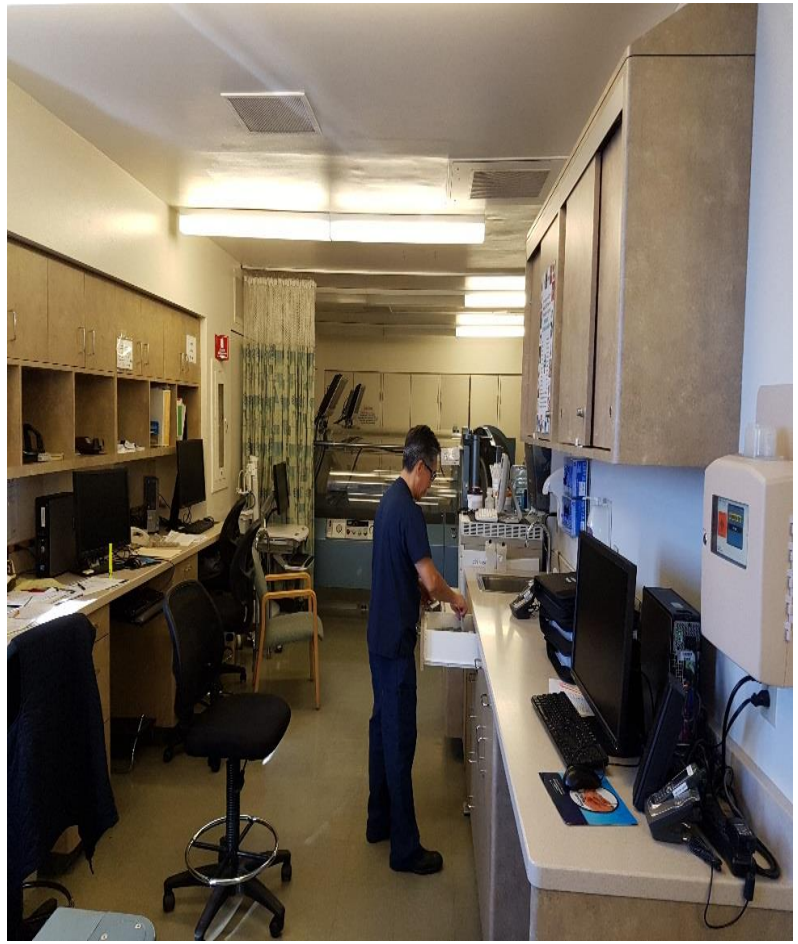
추가 검사?

Multi vs. Mono

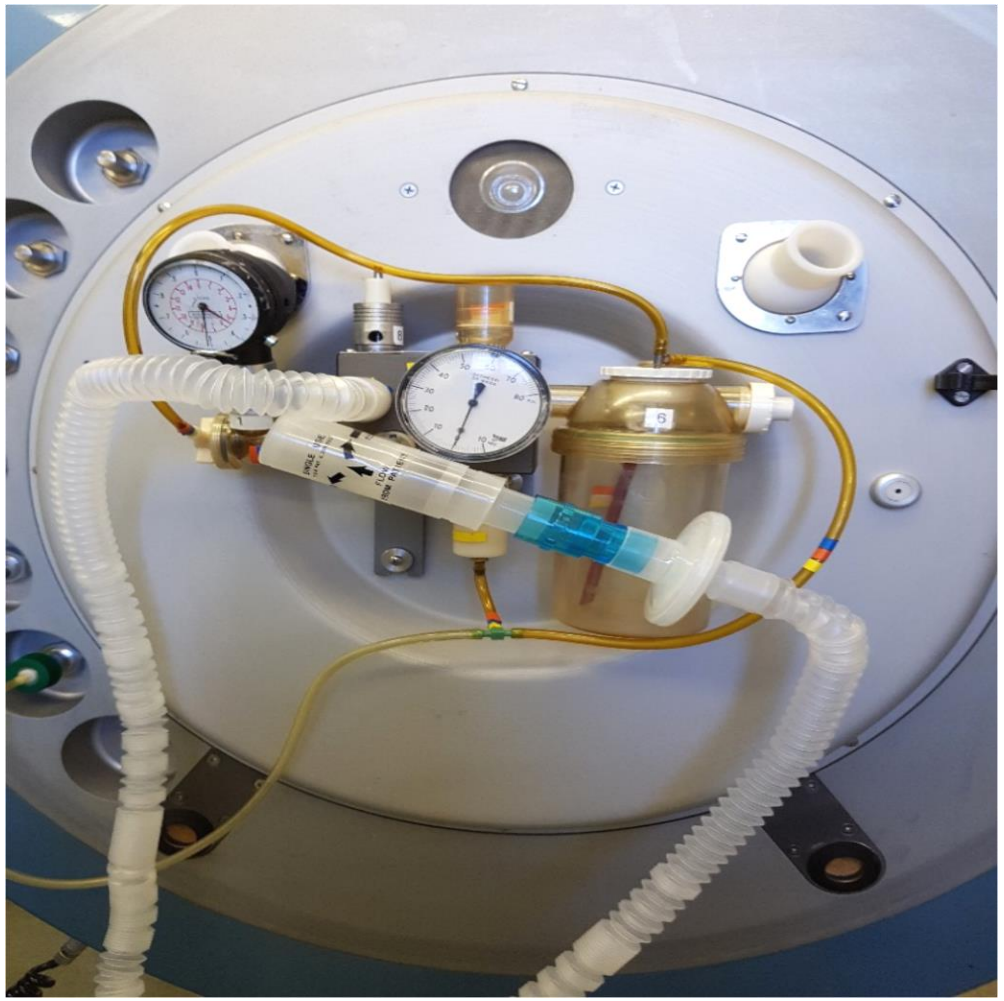
IA 준비 물품?

마음 가짐?

LA long beach memorial hospital HBOT center



ECN 02416
SECHRIST
HYPERBARIC VENTILATOR
MODEL 500A
INC.
DEC.
INC.
DEC.
INC.
FLOW (VOL.)
INH. TIME
EXH. TIME
OFF
ON



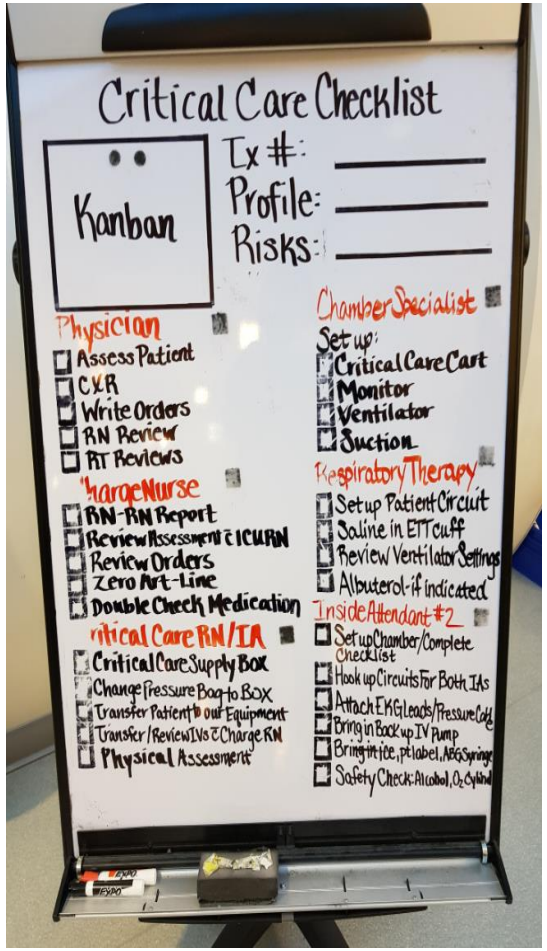
PUMPING STOPPED
20
81.7
200
100

OPENDIS
LVS

Monochamber

- NO instruments in Korea, YET

Multiplace chamber
in Virginia Mason Center for HBOT



Teamwork in the multiplace chamber with intensive care staff members Folke Lind, MD, Annika Rydberg, MD and Karin Andersson, critical care nurse

Critical Patient Inside Attendant Check List		확인란
준비 물품	Suction set : 크린조, suction catheter, suction tube, tygon tube	
	Emergency bag setting	
	Etc : 쓰레기 처리용 봉투, 라텍스 장갑, 티슈	
치료 전 확인 사항	환자명 / 환자번호 / 환자, 텐더 소지품 확인	
	OR car로 교체	
	Zoll monitor 배터리 확인	
	ET tube cuff 증류수 교체	
	peripheral line 2개 이상, 혹은 C-line insert	
	prep 약물 확인 : Epi, atropine 각 1개 / sedation 약물 ativan/nimbex 각 3개	
	여분 main fluid 1개	
	CTSS disconnection	
	Lung sound 확인	
	Foley open	
	restrain band apply(사지)	
치료 중 확인 사항	**가압 중**	
	Pressure bag 압력 확인 및 조절	
	fluid chamber 조절 또는 전체 잠금 (Loading 방지)	
	환자 상태 확인	
	가압 완료	
	Pressure bag 압력 200이상 / 필요 시 zeroing	
	fluid 상태 확인	
	CTSS connection 및 필요 시 Suction 시행	
	감압 중	
	Pressure bag 압력 확인 및 조절	
	fluid chamber 전체 잠금 (Loading 방지)	
	Lung sound 확인 및 BP, SpO_2 Monitoring	
	high flow ventilation (ambu bagging)	
치료 완료	**치료 완료**	
	fluid 정리 및 사용 약물 응급실 인계	
	환자평가 : v/s, mental 확인	
특이 사항		

18-2018 일 02:15:27
Camera 01

Preparing for 2hours of “transport”

- Knowing the patient status
- Endotracheal intubation tube cuff air to distilled water
- Full sedation is better than self-ventilation
- Proper monitoring instrument
- Over-Prep medications and fluid
- Anything that you will need during the treatment session
- Heimlich chest drain valve
  - mechanical one way valve
  - allow air to escape from chest and prevent air from entering chest

- Evaluation of TM for barotrauma needed

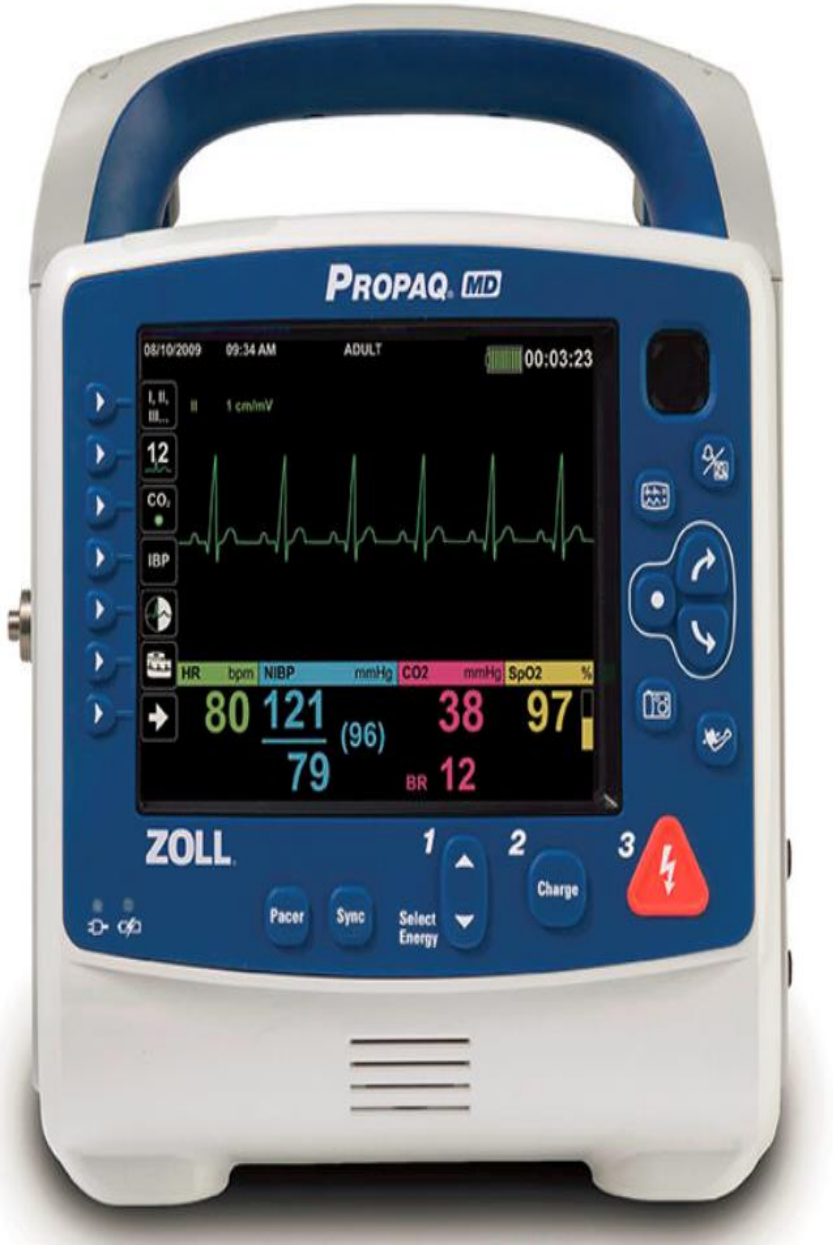
Medical devices

- ECG 3-5 leads sufficient

- IBP/NIBP
  - Only compress the NIBP when in constant pressure

- SpO2
  - Normally values close to 100%
  - Respiratory rate and need of assisted breathing can be a sensitive index of ineffective ventilation
  - TcPO2 can be also used

WelchAllyn
PROPAQ
ALARMS
NIBP
80
121
79
38
12
97


PROPAQ MD
08/10/2009
09:34 AM
ADULT
00:03:23
12
CO2
IBP
HR bpm
NIBP mmHg
CO2 mmHg
SpO2 %
80
121
79
(96)
38
97
BR 12
ZOLL
1
2
3
Pacer
Sync
Select Energy
Charge

Must Check!

- **V/S, Mental Status, CXR, BST**
- **Glaucoma, Heart failure, 감염성 질환**
- **고막상태**
- **Pacemaker/ICD/insulin pump/기타**
- **폐쇄공포증/불안장애**
- **Position/Ambulatory status**
- **Mask application**

For MONOCHAMBER fire hazard is the MUST.

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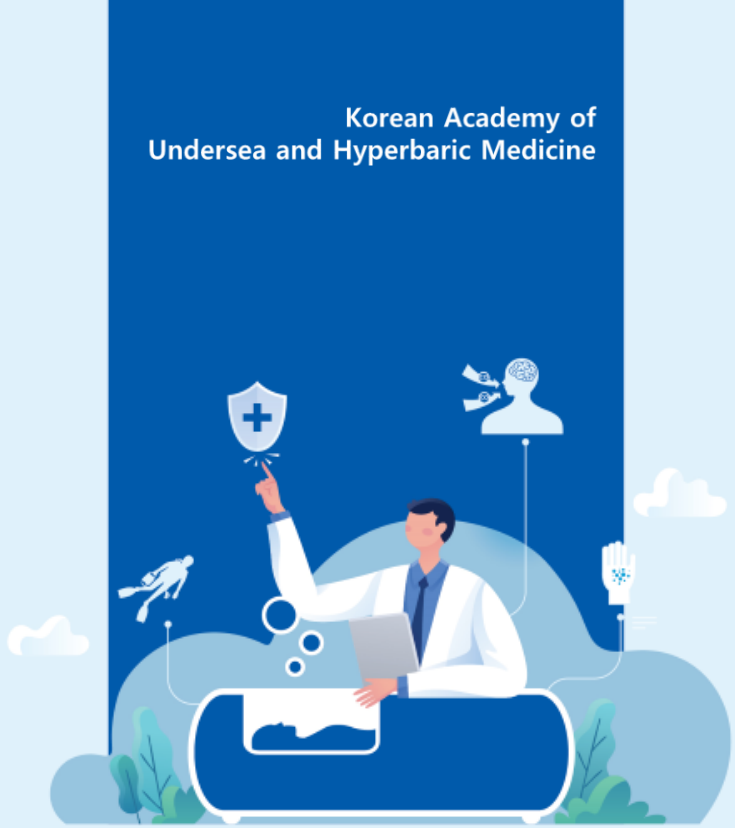
개요

HBOT in Prehospital



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Mobile chambers

Hyperbaric technology

STRETCHER
WARNING

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Thank you

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