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| **Scenario Information** | |
| **Case Name/Topic** | HOBIT Scenario 2-Complication(s) in the Chamber |
| **Target Audience/Learners** | HOBIT Study Sites |
| **Date of Scenario** | April 2018 |
| **Authors/Points-of Contact** | ISEC (Interdisciplinary Simulation Education Center)  Lisa Brown, RN, Simulation Manager  Glenn Paetow, MD, Simulation Fellow  Mindi Driehorst, RN MSN, Simulation Education Specialist |
| **Authorized to share scenario** | Internally (HCMC)  Externally |

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| **Overview of Simulation Scenario** | |
| **Case Summary** | |
| The scenario starts with HOBIT scenario one patient, Thomas Accord, in the monoplace chamber for his second treatment on Day 2 of hospitalization.  The first complication occurs twenty minutes into the treatment at treatment pressure, his ET tube will disconnect from vent circuit in the chamber, resulting in loss of patient ventilation. Team will determine the depressure rate and proper operating procedure to get the patient quickly to surface and stabilize the patient’s ventilation and assess for signs of barotrauma.  The second complication occurs during the same patient’s treatment a week later during the dive. The patient will experience a spontaneous pneumothorax on the right side. Again, the team will need to determine the rate to raise the chamber to surface, stabilize the patient, perform needle decompression, get back up help and end with decision transfer back to the ICU or the patient will arrest, require 2 rounds of ACLS and have ROSC. | |
| Learning Objectives | |
| 1 | Demonstrate algorithmic approach to vent disconnect complication in monoplace chamber |
| 2 | Identify spontaneous pneumothorax and treat to optimize ventilation to increase CPP in HOBIT treatment patient |
| 3 | Identify and operational appropriate emergency chamber procedure |
| 4 | Demonstrate effective communication and coordination in a emergent event |

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| **Critical Action Checklist** | | | |
| **EX** | **Critical Action** | **Notes** | |
|  | **Complication 2** | | |
|  | Recognize ventilation disconnect | |  |
| 1. **222** | MD and Tech determine emergent operational procedure   * Hyperventilate 100% * Switch to manual control * 2 feet per second | |  |
|  | Communicate with team on plan, identifying additional resources   * RT reset vent to 1 ATA * RNS waiting at door to help assist * Verbalize complication and assessment focus | |  |
|  | Determine ongoing dive plan/Study plan and communicate to MD Team | |  |
| **Complication 2** | | | |
|  | Identify suspected PTX and need for urgent decompression per operating procedures | |  |
|  | Identify Right PTX & Perform Needle Decompression | |  |
|  | Demonstrate effective communication between team members | |  |
|  | Stabilize and increase CPP | |  |
|  | Communicate the decision to abort dive to the team including research coordinator/contact and ICU MD | |  |
|  | Transfer patient back to ICU | |  |

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| **Actors & Roles** | | |
| **Role** | **Playing the part?** | **What will they do?**  . |
|  |  | . |
| **Confederate roles:**  Second RT  Code Team or RRT Team | Site to determine (can be one person) | Act as confederate prompting and assisting when team struggling or can act as a distractor to challenge the learners if learners doing well. |
| **Sim Jockey**  **(**runs simulator, set up/ environment) | Sim Staff or trained person | Run simulator and assist as needed. |
| **Debriefer(s)** | Trained sim staff, Pi site coordinator, management and/or study personnel | **Preferred:** trained debriefer + subject matter experts. Role is to debrief the simulation  **Keep track and check off Critical Action Checklist and take notes for debrief** |
| **LRT documenter** | HOBIT person- assigned by sites | Document the LRTs and summarize them in debrief and seeking learners identified solutions. Turn into PI Coordinator |
| **Intended Learners** | Direct Patient Care staff and providers in ED, ICU, HBO, RT, Neurosurgery, Research Coordinator | ICU and HBO RNs  RT  HBO Technician  HBO MD  Research Coordinator |

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| **Information Available to Learners** | |
| Scene Intro | HOBIT Scenario 1 patient is 20 minutes in at treatment pressure (33 feet) in his second dive in HBO Monoplace chamber. Patient’s vent disconnects spontaneously.  *(All staff are available or nearby as usual per institution)* |
| **Additional Information for Learners** | |
| Chief Complaint | Severe TBI and Splenic Laceration |
| Status report | Same condition as prior. |
| History of Present Illness | MVC T-bone highway speeds |
| Past Medical/Surgical History | Initially unknown. Adult sister reveals history of hypertension and arthritis. On Lisinopril and NSAIDS prn for arthritis hips |
| Medications | unknown |
| Allergies | NKDA |
| Family/Social History | Initially unknown, single, construction manager |
| Scenario conditions/resources | Normal resources for institution site |
| Initial Vitals | ABP: MAP 76 HR: 110 RR: per BVM/vent (500, 16, peep 5, 50% FiO2) SpO2: 98% endTidal: 40 Temp: 37.4 rectal ICP: 16 CPP: 68 |
| Physical Exam | * 1. General: Sedated, responds to pain if break in sedation   2. Neuro: Pupils, equal, mild sluggish response GCS 6. Withdraws to pain   3. HENT: WNL   4. Eyes: lacerations sutured & dressed   5. Chest/Pulm: Intubated and on vent, Left chest tube with Heimlich valve   6. CV: Sinus Tachy   7. Abd: Slightly rigid   8. Back: WNL   9. Ext: bruised left leg, appears fractured- splinted; left arm bruising and lacerations dressed.   10. Skin: Bilateral Skin lacerations, multiple abrasions |

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| **Scenario Branch Points** | | |
| **Identify vent Disconnect**  RT to start getting vent BMP ready | **If yes →** | VS- HR to 120  ICP 24  MAP 75  O sat 88% |
| **If no →** | HBO will ask RT if he needs help getting ready and what is the plan? |
| **If still no →** | O2 sats decrease by 5% |
| **MD and Tech determine emergent operational procedure**   * Switch to manual control * 2 feet per second | **Appropriate→** | Accent will take 30 seconds and facilitator announce when at surface |
| **Inappropriate→** | Accent will take as long as facilitator and SMEs determine based on the learners selected protocol  HBO RN Questions procedure |
| **Still Inapprop→** | VS decline further |
| **Communicate with team on plan, identifying additional resources**   * RT reset vent to 1 ATA * RNS waiting at door to help assist * Verbalize complication and assessment focus | **If yes →** | NA |
| **If no →** | HBO RN ask “what the team should do individually to help?” |
| **If still no →** | HBO RN will state, will take over delegation of plan, vent settings per RT and get extra resources and then ask MD what complications they should assess for? |
| **Assess for barotrauma and hyperventilate.**   * Hyperventilate for 2 minutes at 100% FIO2 * End tidal monitoring * Auscultate or US | **If yes →** | VS over two minutes: 110 HR, MAP 75 baseline, ICP down to 16, sats from 82 to 99%, endtidal 45 to 40. Lungs CTAB |
| **If no →** | Let RT take lead and discuss in debrief |
| **If still no →** |  |
| Determine ongoing dive plan/Study plan  And sign off to MD team if going back to ICU. | **If yes →** | Patient remain at current vitals  MD will call in to get hand off prior to transport |
| **If no →** | MD will call in to get hand off prior to transport HBO RN will ask, are we taking him up or rediving? Who else needs to know? |
| **If still no →** | End scenario and debrief |
| Complication 2:  Scenario starts at same place in another subsequent dive at 33 feet (treatment pressure for 15 minutes). Patient’s ventilator alarms low peak pressures.  Patient becomes hypoxic, slightly hypotensive, tachy over 30 seconds; right lung is set as collapsed. HR 110 to 140, MAP drop from 75 to 65. ICP up t0 22. RR is same on vent. Sats 87 % Patient monitor alarms. | | |
| **Identify suspected PTX & need for urgent decompression per operating procedures**   * **Identify change in status** * **Request MD** * **Assess chest rise and find decrease on right.** * **Initiate emergency procedure for PTX** | **If yes →** | VS: stay at above |
| **If no →** | 2 minutes after MD arrival:  VS: MAP 55, ICP 24, sats 83%  AND  If not get MD or additional Team, HBO RN will say, “shouldn’t we get back up and MD?”  If chest asymmetry or PTX not suspected: HBO RN will prompt about vitals declining and point out decreased chest rise or sounds on Right and say we” need to get him out yesterday” or say I don’t think he has any chest rise on the right, could he have a pneumo?”  If proper procedure for decompression not followed, above VS will occur and HBO RN will prompt and appear with proper procedure |
| **If still no →** | Discuss in debrief or optional arrest. ROSC will occur after two rounds of ACLS + needle decompression and chest tube insertion + increase in levophed gtt. |
| **Communicate with team on plan, identifying additional resources** | **If yes →** | NA |
| **If no →** | HBO RN will ask, what do you think is wrong?” or say “What should I do to help when he is out” Ask RT “How are you going to ventilate him and what can I do to help?” |
| **If still no →** | HBO RN will just sit there off to the side, until prompted to assist. |
| **Identify Right PTX & Perform Needle Decompression** | **If yes →** | Right side chest rise and lung re-expansion. HBO RN will say, “ you here a whoosh” |
| **If no →** | HBO RN will ask why his right side of his chest is not rising and this guy’s BP is in the toilet!”  HR increase by 5 points  MAP decrease 5  ICP increase 1 |
| **If still no →** | Patient will cardiac arrest ROSC will occur after two rounds of ACLS + needle decompression and chest tube insertion + increase in levophed gtt. |
| **Demonstrate effective communication between team members** | **If yes →** | NA |
| **If no →** | HBO RN will ask “what is being treated if there is no team vision. IF no closed loop, HBO RN I can’t tell who is doing what?” Or suggest improvement for communication |
| **If still no →** | Discuss in debrief |
| **Stabilize and increase CPP**   * Identify increased ICP * Order open drain * Consider Hypertonics * Increase Levophed/ hold propofol | **If yes →** | VS return to MAP 78, ICP 18, HR 123, Sats 98% per vent or BVM if at 100% fi02 |
| **If no →** | HBO RN will prompt to drain the ICP and suggest consideration of hypertonics if MD does not notice ICP or order anything to raise the CPP  Vitals stay same until drain open, increase levo etc. |
| **If still no →** | “I am opening the ICP drain, increasing the levophed to get a CPP of 75. At what point can we consider hypertonic saline?” |
| **Communicate the decision to abort dive to the team including research assistant/contact and ICU MD** | **If yes →** | Patient remain at current vitals  MD will call in to get hand off prior to transport |
| **If no →** | HBO RN will ask, are we taking him up or rediving? Who else needs to know?  MD will call in to get hand off prior to transport |
| **If still no →** | Discuss in Debrief |

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| **Stimuli for Day of Scenario** | |
| **Labs** | CBC, BMP, Lactate, VBG, repeat BMP |
| **EKG** | Scenario 1 EKG can be used |
| **Radiology** | CXR & CT head |
| **Ultrasound** | Can add image or say outload what findings they would see with their US |
| **Physical Exam Pictures** | None |
| **Miscellaneous** | HOBIT Consent, Checklist, Safety pause checklists, access to HOBIT study information or website to include protocol, Consent, or other needed resources. |

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| **Debriefing Plan**   1. **Watch:** [**High-Fidelity, Case-based Simulation Debriefing Video**](https://vimeo.com/33991081) 2. **Read:** [**Supplementary Debriefing Quick Reference Guide**](https://docs.google.com/document/d/1EbtQGRhKIbDsMve12npeUJ9HqX_oJUQw2a9zanC5HEY/edit?usp=sharing) | |
| Method | Group debrief |
| Materials | HOBIT study materials, LRT Checklist filled out by research PI or assigned staff |
| **Reaction Phase Questions** | 1. How did you feel about the case? |
| **Understanding Phase Questions** | 1. What was going through your mind when you first noticed the patient disconnect..? 2. Do you have an approach you use every time you see someone with…? What is different about this in multiplace chamber? 3. I noticed that… what was going through your mind at that point? 4. How about what your thoughts were when the alarm went off? 5. What approaches do you keep in your back pocket with diving with critical care patients 6. What other complications are you most concerned about when caring for this type of patient? 7. How did the communication go? 8. How did the response go with the arrest? (if patient arrested)? 9. Were there identified equipment or process issues? 10. Were there any process or operational issues? 11. Were there any knowledge gaps? 12. What solutions do you have for the above identified? |
| **Summary Phase Questions** | 1. What main learning point can you take away from this scenario and apply to your clinical practice in the future? |
| **Post Survey Link** | **TBD** |

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| **HCMC Simulation Center Equipment Checklist** | |
| **Scenario** | HOBIT Scenario 2- Longitudinal HOBIT Study |
| **Patient Name** | Thomas Accord, 12/3/63 NKDA |
| **Setting/**  **Environment** | ED Stab area, ICU, HBO (mono place or multi place) |

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| **Equipment Needed** | | | | | | | | |
| On | Avail | **Mannequin** | On | Avail | **Body Fluids** | On | Avail | **Confederates/ checklists:** |
| **x** |  | High Fidelity Adult Simulator on gurney |  |  |  |  | **x** | Adult Sister Lisa |
|  |  |  |  |  |  |  | **X** | HOBIT Study Confederate if ?s |
|  | **X** | ICU Bed and room |  |  |  |  | **X** | Institutions and HOBIT study emergency chamber operations procedures |
|  | **X** | HBO Gurney (if monoplace) |  |  |  |  |  |  |
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|  |  |  |  |  | **Urine** |  |  |  |
|  |  |  | **x** |  | ☐ Foley | On | Avail | **Mannequin Status** |
|  |  |  |  |  | Qual-  clear yellow | **X** |  | Male |
|  |  |  |  |  | Quan     250 | **X** |  | Position:      Supine |
|  |  |  |  |  |  | **X** |  | ID bracelet: Thomas Accord 12/12/64 |
| On | Avail | **Monitor** |  |  |  | **X** |  | Allergy bracelet: NKDA |
| **x** |  | EKG, pulse X, NIBP |  |  |  | **X** |  | ☐ Gown |
| **x** |  | ABP and CVP |  |  |  | **X** |  | Soft wrist restraints |
| **x** |  | Transport Monitor | **x** |  | chest tube with Heimlich valve | **X** |  | ☐ Upper: |
|  | **x** | Temp- 17.8 Rectal |  |  |  | **X** |  | ☐ Lower: Splint on left leg and |
| **x** |  | Arterial Line |  |  |  | **X** |  | Ring on right hand, can’t be removed (use rubber band for ring if none available) |
| **x** |  | Central Line |  |  |  | **X** |  | Wig:  male |
| **X** | **X** | End Tidal monitoring | On | Avail | **Equipment, Tubes** |  |  |  |
|  | **x** | Ventric- once verbalization of placement (straw colored CSF) in ICU | **x** |  | NG tube- LIS |  |  |  |
|  | **X** | Licox- once verbalize placement in ICU | **x** |  | Chest tube- 32 French tube in left chest with collection device | **x** |  | Dressings:  Dressing to left arm repaired lac to right bicep.  Dressing to left forehead laceration. Shadowed bloody drainage.  Dressing to left chest at chest tube site |
|  |  |  | **x** |  | Foley catheter |  | **x** | kerlex wrap & tape to wrap patient’s head for when LICOX and Ventric are “placed” (decision to place them) |
|  |  |  |  |  |  |  | **X** | E consent or consent form for Research Coordinator and MD for LAR consent |
| On | Avail | **Oxygen Delivery Devices** |  | **X** | Heimlich Valve for CT |  |  |  |
| **x** |  | Adult ventilator on chamber |  | **X** | 4 X 4 s for redressing chest tube and tape for ring mitigation |  |  | Moulage:     multiple abrasions |
|  | **X** | Transport ventilator |  |  |  |  |  | 200 to 250 blood in chest tube container |
| **x** |  | Intubated with 7.5 ETT tube 24 @lip |  |  |  |  |  |  |
|  |  |  | On | Avail | **Equipment, Other** |  |  |  |
|  |  | Vent: Mode: AC  TV 500   Rate  16     FiO2  50     PEEP   5  Vent Type: AC |  | **x** | Glucometer |  |  |  |
|  | **x** | Ultrasound |  |  |  |
|  |  |  |  | **x** | Cervical Collar |  |  |  |
|  |  |  | **x** | Backboard |  |  |  |
| On | Avail | **Intubation Equip.** |  | **X** | Clipboard with consent forms, study consent forms, copies of HOBIT checklist and safety pause. |  |  |  |
|  | **X** | Routine Airway equipment for emergencies |  | **x** | Code Cart |  |  |  |
|  |  |  |  | **x** | Airway Cart/ RN Cart |  |  |  |
|  |  |  | On | Avail | **Procedures** |  |  |  |
|  | **x** | BVM |  | **x** | Needle thoracostomy |  |  |  |
|  |  |  |  | **x** | Chest Tubes and insertion kits |  |  |  |
|  |  | ETCO2 detector |  | **X** | 16 gg angiocatheter |  |  |  |
|  |  | Bulb detection device |  |  |  |  |  |  |

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| **Medications Needed** | | | | | | | | |
| **On** | **Avail** | **IV access and Fluids** | **On** | **Avail** | **Cardiovascular** | **On** | **Avail** | **Narcotic/Analgesics** |
|  |  |  |  |  | *Anti-arrhythmic* | **x** | **x** | Fentanyl 50 mcg/mL (CADD pump on + IV injection available for HBO chamber) |
| **x** |  | Saline lock X 2 |  |  | Adenosine 3 mg/mL |  |  |  |
| **x** |  | Pump Type: Six Large volume |  |  | Amiodarone 30 mg/mL |  | **x** | Dilaudid |
|  |  |  |  |  | Atropine 0.4 mg/mL |  |  |  |
| **x** |  | Right IJ Trauma Central line |  |  | Digoxin 0.25 mg/mL |  |  |  |
| **x** |  | Right radial Art line |  |  | Lidocaine 1 mg/mL |  |  |  |
|  |  | IVF     NS @ 100 |  |  | Procainamide 500 mg/mL |  |  | **Sedative/Hypnotic** |
|  |  | Propofol @40mcq/kg/min |  |  | *Beta-blocker* |  | **x** | Diazepam 2 mg/mL |
|  |  | Norepi drip @ 0.03 mcg/kg/min |  |  | \*Esmolol 10 mg/mL |  | **x** | Lorazepam 1 mg/mL |
|  |  |  |  |  | Labetalol 5 mg/mL |  |  | Midazolam1 mg/mL |
|  |  |  |  |  | Metoprolol 1 mg/mL |  |  |  |
|  |  |  |  |  | Propranolol 1 mg/mL |  |  | **Intubation Induction** |
|  |  |  |  |  | *ACE Inhibitor* |  | **x** | Etomidate |
|  |  |  |  |  | Captopril |  | **x** | Ketamine 50 mg/mL |
| **x** |  | Blood product--     PRBs |  |  |  |  | **x** | Propofol 10 mg/mL |
|  |  |  |  |  | *Calcium channel blocker* |  |  |  |
|  | **x** | Other: extra fluids |  |  | Diltiazem 5 mg/mL |  |  |  |
|  |  |  |  |  | \*Nifedipine |  |  |  |
|  |  |  |  |  | \*Nimodipine |  |  |  |
|  |  |  |  |  | Verapamil 2.5 mg/mL |  |  | **Paralytic** |
|  |  |  |  |  |  |  | **x** | Atracurium 10 mg/mL |
| **Paper** | **Electronic** | Stimuli  Provide Paper or Electronic when asked |  |  | *Inotrope/Pressor* |  |  | Cisatracurium 2 mg/mL |
|  | **x** | BMP, LFTs, Troponin, Coags, CBC Plt, UA, Tox, CK, repeat HbB in SICU, Glucose in SICU |  |  |  |  |  | Pancuronium 1 mg/mL |
|  | **x** | EKG |  | **x** | Epinephrine |  |  | Rocuronium 10 mg/mL |
|  | **x** | Hospital |  |  |  |  | **x** | Succinylcholine 20 mg/mL |
|  |  |  |  | **x** | Norepinephine |  | **x** | Vecuronium 1 mg/mL |
|  | **x** | Cardiac, Lung, FAST US |  | **x** | Phenylephrine |  |  | Other\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
|  | **x** | X-ray Chest , arm, leg |  | **x** | Dopamine |  |  |  |
|  | **X** | CT- head |  |  | Dobutamine |  |  |  |
|  |  | MRI |  |  |  |  |  | **Reversal Agents** |
|  |  |  |  |  | *Anti-hypertensive* |  |  | Edrophonium 10 mg/mL |
|  |  |  |  |  | Nitroglycerin |  |  | Flumazenil 0.1 mg/mL |
|  |  |  |  |  | Nitroprusside |  |  | Glycopyrrolate |
|  |  |  |  |  |  |  |  | Naloxone 1 mg/mL |
|  |  |  |  |  | **Miscellaneous** |  |  | Neostigmine 1 mg/mL |
|  |  |  |  |  | \*Albuterol |  |  |  |
|  |  |  |  | **x** | Calcium chloride 10 mg/mL |  |  |  |
|  |  |  |  | **x** | \*Calcium gluconate |  |  | **Anti-emetic** |
|  |  |  |  | **x** | Na bicarbonate 1 mEq/mL |  |  |  |
|  |  |  |  | **x** | \*Solu-Cortef 125 mg/mL |  |  |  |