



**Sepsis simulation tool: ED**

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| **Simulation basics** | |
| **Who:** | Simulation is a teaching method that can be used to facilitate educational opportunities for all healthcare professionals. When developing a simulation training event the educator should envision all potential disciplines that might care for that particular type of simulated patient. For instance, a patient with septic shock seeking care in the Emergency Department would encounter the following healthcare personnel: (a) physician/advanced care provider, (b) nurse, (c) lab technician, and a (d) pharmacist. Having multiple disciplines involved in the training event allows for a better assessment of potential gaps in care. The lab personnel could provide feedback on ways to expedite results or a pharmacist could assist in evaluating how to more rapidly administer antibiotics. |
| **What:** | Simulation enables healthcare personnel the chance to provide realistic care to a simulated patient in a safe environment. During a scenario participants are encouraged to simulate all aspects of care (i.e. programming pumps, calculating medications or performing a skill). Replicating all aspects of care is important. For example, a participant may understand that a norepinephrine drip is needed but get confused with programming the IV pump. Gaps in participant education, communication, and equipment use can be assessed following the educational event. Simulation scenarios can be repeated time and time again so that large numbers of personnel are trained for a specific incident. The training event should actively engage all learners. The educator should document the group’s progress of the event so it can be reviewed later for performance improvement. Simulation should be done in a relaxed setting where there is no blame, belittling or negative comments. |
| **Where:** | The simulation space should replicate the patient care environment. If possible, simulation could be performed in an actual patient room or within the department the patient may present to or be cared for. In the event that an actual patient care setting cannot be used the educator coordinating the event should ensure all necessary supplies are available for the group to use. A sample electronic medical record (i.e. the playground in Epic) should be available during the scenario. |
| **When:** | A simulation event should occur after initial training of the group members. For example, the participants should be given education on algorithms, bundles or order sets prior to the simulation. Providing initial training will reduce the amount of time that the group will need to pause to read over documents thus reducing stress and frustration. |
| **Why:** | Simulation is an excellent teaching method which ensures the learner understands all aspects of patient care in a particular scenario. When teaching a case scenario learners may be able to state actions to take or goals to achieve in care but the actual process may present delays in care or barriers to the healthcare team. Simulation can help identify ways to improve care or it can help provide the team with confidence that they possess the knowledge to provide proficient care. Examples of problems which may arise during simulation include: (a) lack of knowing how to use equipment, (b) unsure of where to obtain supplies, (c) working out glitches in electronic medical records, and (d) lack of good team communication. All gaps should be discussed in debriefing and the educator should look for trends amongst various groups to then tailor additional educational opportunities. |
| **How:** | For educators or participants who would like to use simulation but have little experience in this teaching method viewing example scenarios may be beneficial. Many simulation events are recorded on websites such as youtube. The educator should create a training event with goals of what is to be learned in mind. Begin by creating a scenario ensuring that enough patient information will be provided to the group of participants (i.e. weight, medical history, and allergies). The educator should be sure to make a list of needed supplies as the simulation is constructed. While developing the simulation scenario envision the path learners may take in providing care to the patient and provide tools and resources to assist the group. If the topic is new the educator should provide tools for the group to prepare prior to the event (i.e. algorithms). Consider consulting other disciplines in the construction of the scenario. For example, if a central line should be placed consult an Infection Preventionist to ensure facility protocol (i.e. bundle) is followed.  To set-up for the simulation event replicate a patient care environment and be sure to use equipment and supplies consistent with the facility. Be sure to let others know of the need for expired or unused equipment (i.e. central line kit opened but not used). Various forms of human patient simulators (mannequins) exist with a wide range of functions. Some simulators can replicate heart sounds, lung sounds, and vocal noises. Should an educator not have access to a human patient simulator creativity with a CPR mannequin or other props should be considered; make the event as “real” as possible.  On the day of the event encourage the group to actively engage the mannequin. Begin the scenario by introducing the patient situation by giving a verbal report. Have group members speak with the mannequin as the educator provides “the patient” response. If the group fails to communicate with the simulator make statements such as “What is happening” or “I don’t feel well”. The educator may choose to provide subtle reminders to the group during the event or they may refrain from providing any feedback until the event is completed. During the event frequent prompts by the educator should be avoided. The educator should take notes during the event for use during the debriefing.  Debriefing is the review of the simulation event by all group members and should be conducted right after the event concludes. The group should discuss points which need to be improved upon and aspects which went well. The debriefing process should remain positive and the educator should guide the group in reflection of the event. Questions for group reflection should be created prior to the simulation event and should focus on key learning objectives. For example, the educator may ask questions as to why a lab test is important, the side effects to monitor for after medication administration or what information is key in giving report. The group’s communication should be addressed in the debriefing process. Reflect if verbal orders were acknowledged, how was the patient/family informed of a change in condition (i.e. did staff say it will be “ok”), and did the team support all group members. |
| **Emergency department sepsis simulation** | |
| **Set-up:** | In a simulated patient environment set up a female mannequin. Have a sample electronic medical record if possible with the information below entered. If using a programmable human patient simulator enter the lung sounds as crackles, normal heart tones, and normal bowel tones – enter vital signs below. Be sure to educate group participants of simulator capabilities. Be sure to have participates demonstrate programming of the IV pump with medication administration when warranted. Review steps below and have appropriate equipment available. |
| **Patient information:** | The time is 0900. Dorothy is a 68 year-old female who arrived to the ED by private car driven by her neighbor with chief complaints of weakness, dizziness, fever and chills. She had great difficulty standing to get out of the car and required two staff members to assist her. She is a full code. Her medical history includes: heart failure and hypertension. She is a one pack per day smoker. She lives at home with her husband who did not present with her as he had surgery a few days ago. Her current weight is 230 pounds. Allergies include penicillin and iodine. She has had limited oral intake over last two days due to nausea and decreased appetite. Her skin is pale and moist. Respirations are labored. No family is currently present. |
| **Scenario events:** | The table below can be used as a way for the educator to document events. Fully review the table before the simulation event. Multiple events may occur at once and it might be best to have one educator control the simulator and provide verbal responses while another educator takes notes. Vital sign changes can be communicated verbally or by changing the human patient simulator settings. Check yes or no to indicate if the action occurred and document the time the intervention occurred. It may be best to use a minute style stop watch to indicate how many minutes pass before the intervention is addressed by the group. As the educator, allow the actions of the group to occur unprompted as much as possible to better evaluate team progression. Modify or revise the table below to reflect organizational policies and procedures. |

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| **Action** | **Yes** | **No** | **Time** | **Comments** |
| **Initial assessment:**  Blood pressure: 84/52  Pulse: 145 – sinus tachy.  Temp: 101.5 (tympanic)  Oxygen saturation: 86% on room air  Respirations: 22, labored  Skin pale  Diaphoretic  Lung sounds: coarse crackles  Heart tones: S1S2 – regular  Bowel sounds: present  Patient states, “ I feel terrible”  Confused  Hint: may spray light mist of water on mannequin (if does not cause harm).  \*\*Have supplies to obtain vital signs |  |  |  | Vital signs should be reassessed frequently. Blood pressure does not raise greater than 80’s. |
| Sepsis screening tool completed  \*\* Have copy available for use |  |  |  |  |
| Physician notified and/or rapid response team notified |  |  |  |  |
| Cardiac monitor  Vital signs at least every 15 minutes  Hint: If able change simulator vital signs every 10 minutes – vary vitals based on group interventions. BP remains low |  |  |  |  |
| Establish 2 large bore IV sites  Labs obtained with IV start?  \*\*Have IV supplies available |  |  |  |  |
| Obtain labs  Lactate, blood cultures, UA/UC, electrolytes, BUN, Creat., liver panel, ionized Ca, Mg, Phosphorous, PT/INR, type and screen, etc.  \*\*Have lab collection tubes available |  |  |  | Have supplies to practice obtaining blood with IV start – If aligns with facility policy. |
| Indwelling urinary catheter – If placed 150mL of amber colored urine return  \*\*Have catheter supplies available  Note: Iodine allergy |  |  |  |  |
| Consider source of infection   * Cultures * Chest x-ray * Sputum culture |  |  |  |  |
| Severe sepsis bundle orders  \*\*Have paper copy if sample electronic medical record not available (use facility specific) |  |  |  |  |
| 30 mL/kg crystalloid bolus  230 pounds (104 kg) x 30 mL/kg = 3136mL for bolus (3 liters of fluid) |  |  |  |  |
| Antibiotic administration  **Note**: Allergy to PCN  \*\*Have secondary IV tubing and “pretend” IV antibiotics available  Tip: consider use of barcoding or checking patient identification. Staff will need to determine compatibility of IV solutions and which medications to administer first. |  |  |  | Note type of antibiotics ordered and dosage: |
| Vital signs following fluid bolus:  Blood pressure: 78/46  Pulse: 150 – sinus tach on monitor  Temp: unchanged  Oxygen saturation: 88% on 2L  Respirations: 20 - shallow  Remains confused – verbal, but answers questions inappropriately  **Read lab results to group**  Lactate: 4.2  WBC: 2.0  Hemoglobin: 9.2  Creat: 2.4  INR: 2.1 |  |  |  |  |
| Family notified  Note how information was communicated to a family member |  |  |  |  |
| Transfer to ICU or Transfer Trigger Tool Used  \*\*Have copy of Transfer Trigger Tool |  |  |  |  |
| Placement of central line  (use bundle or facility protocol)  \*\* An expired kit or unused kit can be helpful for staff to review  \*\* Have written bundle protocol available |  |  |  |  |
| Measure CVP  Tip: It may be difficult to simulate CVP monitoring– print sample strips of CVP monitoring off prior to scenario to show to group waveforms and reading  \*\*Have supplies available if appropriate for facility |  |  |  |  |
| Vasopressor drip    \*\* Have facility protocol available for reference  How is it set up? How is it dosed or double checked? Program the IV pump. |  |  |  |  |
| Variation: May consider having patient have an allergic reaction after Vancomycin administered and after indwelling catheter placed. May stimulate good trouble shooting/discussion as to if reaction from iodine (if used) or if from red-man syndrome. |  |  |  |  |
| Measure ScvO2  \*\*Facility appropriate |  |  |  |  |
| If Hgb < 9 gm/dL – consider transfusion |  |  |  |  |

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| **Questions to consider following simulation:** |
| * Was the screening tool easy to use? Do you have questions on positive or negative screens? * How did nursing plan to administer multiple IV medications at once: (a) rapid IV fluid bolus, (b) antibiotics, (c) vasopressor drip. * Does the iodine allergy need to be considered? How does the penicillin allergy affect treatment? * If the WBC is low does that mean there is no infection? * Are the current IV sites appropriate for to use for a vasopressor drip? Why? * Discuss steps which may facilitate rapid administration of antibiotics. * When should the lactate levels be repeated? What if they elevate? * Are blood cultures always positive? * Should Vancomycin always be used? Why? What complications can arise with Vancomycin administration? * What should be done if a patient has multiple allergies to antibiotics? * How is the rapid response team activated (i.e. what number is called)? * What are signs and symptoms of organ dysfunction? * When should a vasopressor be used? What complications can arise with vasopressor usage? * What can be done to improve patient care in our facility? * What areas do you need more information/education on? |