After returning from radiology, an elderly patient with multiple medical problems was found in the ED (emergency department) treatment room with a pulse oximetry of 73%, bradycardic, and unresponsive. It was identified that the portable oxygen tank on the patient’s bed was empty. The patient was intubated and admitted to the coronary care unit.*

Challenges in ensuring sufficient oxygen during patient transport, initially identified in a September 2005 Pennsylvania Patient Safety Advisory article, persist in Pennsylvania hospitals. Patients who have a critical need for continuous supplemental oxygen add an additional layer of risk during intrahospital transport.

Such patients are usually supplied by a central oxygen source. Once removed from a central oxygen source, they are supplied by a portable source (i.e., oxygen tank) for use throughout transport, including during wait and reconnection times, to various sites within the hospital for tests, procedures, and therapies. Using situational awareness and calculators to determine the anticipated duration of oxygen therapy needed may help avoid events with unintended interruptions in the administration of oxygen.

Analysts queried the Pennsylvania Patient Safety Reporting System (PA-PSRS) database for events during the most recent 10-year reporting period, January 1, 2005, through December 31, 2014, that contained the keywords “oxygen tank,” “O2,” “air,” or “empty O2 tank” and events reported as respiratory care medical gas errors. The query identified 393 oxygen tank-related events (including some previously discussed in the 2005 article), of which analysis determined 360 were associated with unintended interruptions in the administration or management of oxygen therapy. Empty oxygen tanks accounted for 84.2% (n = 303 of 360) of the event reports. See the Figure.

The majority of event reports related to empty oxygen tanks, 96.4% (n = 292 of 303), occurred in settings such as medical-surgical units, rehabilitation units, diagnostic imaging locations, and emergency departments. Only 3.6% (n = 11 of 303) of the empty oxygen tank–related event reports occurred in an intensive care unit.

Healthcare personnel responsible for transporting patients requiring supplemental oxygen help confirm whether the oxygen tank selected for use contains enough oxygen for the duration of time needed to complete the test or procedure, transport the patient to and from the test or procedure site, and reconnect the patient to the central oxygen source, including wait times throughout these processes. Calculating whether the amount of oxygen in the tank is adequate can avert transporting a patient with an empty or insufficiently filled oxygen tank. Calculations can be performed using formulas, look-up tables, or calculator applications available both online and as mobile apps. An Internet search identified several online oxygen tank calculator applications. It is important to note that while calculator applications are useful, there may be little to no regulatory oversight or assessment of their accuracy. One calculator requires knowing the size of oxygen tank (e.g., E tank), the remaining tank pressure (i.e., pounds per square inch), and the flow rate of oxygen to the patient (liters per minute) to calculate the remaining duration of oxygen delivery. Another calculator allows the user to either determine the amount of time remaining in the tank based on a particular gauge pressure or determine the necessary gauge pressure required for the estimated duration of time the tank will be in use. Both calculators provide the formulas so the user can verify the results.

* The details of this PA-PSRS event narrative have been modified to preserve confidentiality.
Before connecting a patient to a portable oxygen tank, determining whether the tank contains a sufficient amount of oxygen for the duration of patient transport, including the time for the procedure or test in addition to wait and reconnection times, can help avoid unintended interruptions in providing supplemental oxygen.

NOTES


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