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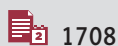
# Pronounced Dead Twice: What Should an Attending Physician Do in Between?

## Authors' Contribution:

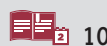
Study Design A  
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**Corresponding Author:** Annie Bao, e-mail: [annie.bao@duke.edu](mailto:annie.bao@duke.edu)**Conflict of interest:** None declared**Patient:** Female, 39-year-old  
**Final Diagnosis:** Acute Fentanyl toxicity due to a Fentanyl injection in the hospital  
**Symptoms:** Unresponsive  
**Medication:** Fentanyl  
**Clinical Procedure:** Endovascular coiling for the ruptured berry aneurysm  
**Specialty:** Neurosurgery**Objective:** Unusual clinical course**Background:** Organ donation after cardiac death (DCD) is a well-accepted practice in the medical, philosophical, and legal fields. It is important to determine the amount of time required for the loss of circulation to lead to irreversible brain loss, and ultimately brain death.**Case Report:** We report a rare case of organ donation after cardiac death. During organ procurement, it was noted that the patient's aortic and renal arteries were pumping and pulsing, and her cardiopulmonary activities were back to unexpected levels. The organ procurement surgery was stopped. At the time, the patient was given Fentanyl and Lorazepam. Subsequently, she was pronounced dead again 18 minutes after she was initially pronounced dead. After a complete autopsy, the cause of death was determined to be acute Fentanyl toxicity due to a Fentanyl injection in the hospital. The manner of death was determined to be homicide.**Conclusions:** What should an attending physician do in the rare case that the organ procurement team notices the patient is still alive? It is our opinion that: first, the organ procurement team should leave the room immediately and withdraw from the case, and second, the attending physician should let nature run its course and refrain from excessive medical intervention.**Keywords:** Autopsy • Bioethics • Death • Fentanyl • Resuscitation Orders • Tissue and Organ Procurement**Full-text PDF:** <https://www.amjcaserep.com/abstract/index/idArt/930305>

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## Background

Organ donation after cardiac death (DCD) is a well-accepted practice in the medical, philosophical, and legal fields. It is important to determine the interval between asystole and beginning the organ procurement procedure after pronouncing cardiac death. There are 2 differing conditions that must be met before DCD can take place: (a) determine the amount of time before autoresuscitation of the heart is impossible, and/or (b) determine the amount of time that is required for the loss of circulation to lead to irreversible brain loss, and ultimately brain death. Depending upon the specific DCD protocol one is following, the amount of time that is recommended to wait for these 2 conditions to occur has ranged from 90 seconds to a full 10 minutes [1].

Autoresuscitation, also known as the Lazarus syndrome or Lazarus phenomenon, is the spontaneous return of circulation after cardiac arrest and is incidentally seen after failed cardiopulmonary resuscitation (CPR) [2,3]. The occurrence of this phenomenon may be widely underreported, as illustrated by the fact that almost 50% of French emergency physicians claim to have encountered autoresuscitation in clinical practice, and more than one-third of Canadian intensivists have seen at least 1 case of autoresuscitation. The true incidence remains unknown [3].

A systematic review of autoresuscitation after cardiac arrest reported a total of 45 cases of autoresuscitation after failed cardiopulmonary resuscitation. In these 45 cases, no case of autoresuscitation in the absence of cardiopulmonary resuscitation was reported [4,5]. The only case of autoresuscitation without cardiopulmonary resuscitation was documented in 2019. An 86-year-old woman was found unconscious by her husband. Ambulance personnel diagnosed a third-degree AV block. Due to a 'do not resuscitate' order, no resuscitation was performed. She eventually developed a documented asystole of more than 4 minutes. Against all expectations, she regained sinus rhythm and fully recovered. Eventually, a pacemaker was implanted and she was discharged home without neurological sequelae from cardiac arrest [2].

The Uniform Declaration of Death Act (UDDA) has been a source of ongoing controversy since it was first proposed by the President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research. It reads: An individual who has sustained either irreversible cessation of circulatory and respiratory functions, or irreversible cessation of all functions of the entire brain, including the brain stem, is dead. A determination of death must be made in accordance with accepted medical standards [6,7].

In organ donation, the "dead donor rule" must be followed [1,8]. The ultimate "gold standard" is the brain death organ donation. There are 2 obligations of the "dead donor rule." The first of these is the ethical principle requiring brain death prior to the removal of organs. The second ethical principle is the overall prohibition of the act of organ donation and the procurement from killing the patient [1].

Brain death organ donation is not the only type of organ donation practiced today. In patients that do not meet the conditions of brain death, either as conscious, capacitated patients or incapacitated patients in comas or persistent vegetative states, there is still the possibility of donation after cardiac death (DCD) once life support has been withdrawn [1].

However, there is still no set protocol for what an attending physician should do if autoresuscitation occurs during organ procurement after the DCD conditions mentioned above have already been met.

## Case Report

A 39-year-old woman was a case of donation after cardiac death. She had a medical history of Down syndrome, a ruptured berry aneurysm of the Circle of Willis, and status post endovascular coiling for the ruptured berry aneurysm. After consent was provided from the family, she was administered Heparin, Fentanyl, and Lorazepam and was terminally extubated. Her heart rate and oxygen saturation levels dropped rapidly. Her heart rate dropped into the 40s from the baseline heart rate in the upper 90s. Her oxygen saturation levels dropped to less than 10%. At 2: 57 A.M., she had no measurable blood pressure, no oxygen saturation, and no respiration. A physician listened to her heart under the sterile drape for an additional 2 minutes. During that time, no heart tones were heard. Her pupils were fixed and dilated, and her face was cyanotic/mottled. Her spontaneous respiration halted, and there was no palpable carotid pulse. She was pronounced dead at 2: 59 A.M.

After cardiac death was pronounced, an abdominal midline incision was made to begin organ procurement at 3: 00 A.M. It was seen that her aortic and renal arteries were pumping and pulsing. The organ procurement surgery was stopped. It was noted that she had spontaneous agonal respiration. Her heart rate was back in the mid-80s to 90, and her blood oxygen saturation levels were back in the 50s. At the time, the patient was given additional doses of Fentanyl and Lorazepam. Subsequently, she was pronounced dead a second time at 3: 17 A.M.

The decedent was no longer released for organ or tissue donation by the local coroner's office. A complete autopsy was performed. Positive findings include a vertical central abdominal

incision and status post endovascular coiling for the ruptured berry aneurysm at the left posterior communicating artery with blood clots in the ventricles. There was no other macroscopic disease identified or evidence of trauma. A postmortem subclavian blood toxicology study found 6.3 ng/mL of Fentanyl, 17 ng/mL of Lorazepam, 15 mcg/mL of Levetiracetam, and 29 ng/mL of Ziprasidone. The cause of death was determined to be acute Fentanyl toxicity due to a Fentanyl injection in the hospital. Another significant condition contributing to death was a ruptured berry aneurysm of the Circle of Willis. The manner of death was determined to be homicide. It is our opinion that the additional dose of Fentanyl given between 3: 00 A.M. and 3: 17 A.M. was the direct cause of death.

The levels of Lorazepam, Levetiracetam, and Ziprasidone were in the therapeutic ranges. The 6.3 ng/mL of Fentanyl was at an acute lethal level. Fentanyl has a high affinity for  $\mu$ -opioid receptors, which accounts for the profound central nervous system and respiratory depression responsible for its significant morbidity and mortality. Clinical effects are dose-dependent, ranging from serum concentrations of 0.3-0.7 ng/mL providing analgesia alone, to  $>3$  ng/mL, causing the loss of protective airway reflexes and central nervous system depression in opioid-naïve patients. Deaths have been reported in a range of patient settings with postmortem serum concentrations ranging from 3 to 383 ng/mL [9].

## Discussion

In forensic pathology, an arbitrary event is needed to legally record the time and date of death. For example, the time and date of death is the time and date the body was found. However, the decedent could have died days or weeks earlier. In hospitals or other witness settings, a medical professional can use current tools and his or her experience to determine the time and date of death, such as when the carotid artery pulse cannot be palpated, or when the cardiac tone cannot be heard using a stethoscope. Other hospital devices can also be used; for example, the electrocardiogram (EKG) machine can indicate cardiac arrest, and the electroencephalogram (EEG) can detect brain death. After a person is pronounced dead using the aforementioned tools, he or she is legally in the state of death. At this time, organ donation can proceed.

The history of organ donation is one of crossing lines and moving boundaries. The line between the impossible and the possible has shifted over time. The protocol for donation after cardiac death (DCD) has also adjusted. The amount of time a physician should wait between asystole and pronouncing death, for example, varies among institutions and has been scrutinized in the ethics literature, as has the permissibility of interventions to facilitate donation on potential donors prior to death [10].

Enforcing the “dead donor rule” is challenging in view of the physician’s experience and the tools they use. Palpating the carotid artery on the neck, listening to the heart and lungs using the physician’s stethoscope, observing pupil dilation and the color change of the face, and relying on EKG and EEG are all indirect indications of death. Due to diagnostic imprecision, ambiguity, and intangibility, many questions may arise: Is the potential donor really dead? How long does an attending physician need to wait between asystole and beginning the organ procurement procedure after pronouncing death? How long should an attending physician wait before autoresuscitation is impossible?

In our case report, there may have been no autoresuscitation. The patient may not have experienced cardiac arrest, and her heart might never have stopped at 2: 59 A.M. It is possible that her heart could have been in a state of such weakness that a physician could not hear her heart tones or palpate her carotid artery pulse. Likewise, it is possible that her respiration could have been at the level where it could not be heard by the physician. Perhaps the indirect indications could not have been recorded due to the level of experience of the physician or the imprecision and intangibility of diagnostic tools. It is also debatable that the surgical incision made on her central abdomen stimulated her adrenal glands, which reacted to the incision. Her adrenal glands released the residual epinephrine, norepinephrine, and steroid hormones, which caused her heart rate and blood pressure to return to detectable levels, as well as her agonal respiration.

After autoresuscitation, the next step for the attending physician is also debatable in the medical, legal, philosophical, ethical, and spiritual fields. Should we let nature run its course or use medical intervention? Who has the authority to do so? On the other hand, medicine is always an imperfect science. It is possible that the incidence of this case occurs 1/10 000 times or even 1/1 000 000 times. Medical professionals have a dilemma when preventing the impossible, and the legal and ethical world cannot make specific rules in advance when faced by this unfamiliar event.

## Conclusions

What should an attending physician do in rare cases when the organ procurement team notices that the patient is still alive? It is our opinion that: first, the organ procurement team should leave the room immediately and withdraw from the case; second, the attending physician should let nature run its course and refrain from excessive medical intervention.

## Conflict of Interest

None.

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