
Brain Death

By Carol Bayley, Ph.D.
VP Ethics and Justice Education
Dignity Health

It used to be that when someone died, we knew it. The chest didn't rise and fall, there was no heartbeat when we listened, we felt no breath from the mouth or nose. Think of a gangster movie or a cop show. "Big Jimmy the Butcher is dead, Officer, and now we can all go home" was preceded by someone taking Big Jimmy's pulse, or putting an ear to his chest.

Although that is still the likely TV scenario, things have changed in medicine. Now there are TWO ways to tell whether someone is dead. One is the old-fashioned way--no breath, no pulse. When someone dies in her sleep in a nursing home, the nurse that finds her in the morning can tell she is gone in this old-fashioned way. The nurse uses "cardio-respiratory criteria"--a medicalized way of saying the old woman had no breath, no pulse, and is now dead. The body may be bluish or mottled in color, and may even have begun to get cold.

The other way of telling if someone is dead is to use neurologic, or brain, criteria. There are some situations where trying to use the old "no breath, no pulse" criteria doesn't work, because the body's natural expression of death as the failure of heart and lungs has been overridden by medical intervention. A good example of this is when a young and healthy person, let's call her Jane, is in a terrible auto accident. Jane has massive internal injuries, many broken bones, a broken neck and worst of all, she sustained a massive blow to the head. The ambulance rushes to the scene and medics begin CPR or cardio-pulmonary resuscitation (pounding on the chest to make the blood pump, blowing into the mouth to make the lungs expand with oxygen). Soon, the medics attach Jane to mechanical means of CPR so that they can get her to the hospital.

When she arrives, the doctors do everything they can to help her, but unfortunately, they cannot save her life. Jane dies. But she dies while she is still connected to the machines that push air in and out of her lungs. So how do the doctors determine that Jane is dead? They use neurological, or brain, tests. Jane is just as dead as the woman in the nursing home, but the way their deaths are determined is different, because Jane's heart and lung failure was hidden by the machine. She looks pink and feels warm because her blood is still artificially being circulated throughout her body. What the brain tests show is that the "command and control" center of the body, which is the central nervous system governed by the brain, is totally and irreversibly unable to perform its function. With no functioning brain, the body shuts down. The thermostat goes out of control, the kidneys shut down, the liver fails, everything goes. Even if Jane remained connected to the machines, these other body systems would eventually surrender.

The one silver lining behind the dark cloud of Jane's terrible and untimely death is that the machines that keep her pink and warm can also keep her kidney, liver and other organ tissues functioning

for a little while. It is as if they haven't heard that the landlord has left and turned off the lights and heat in the whole building. They can pretend to survive until night falls, but after that they better get out. "Getting out" in the case of Jane's liver and kidneys means that these organs, if they are kept in good condition, can be removed from Jane's dead body, where they won't do any good, and be transplanted into another person who needs them.

Being determined to be dead by brain criteria is sometimes called "whole brain death" or just "brain death." It is a little misleading, though, because it can sound as if the person isn't really all the way dead, which of course isn't true. It is a little like calling the lady in the nursing home "heart and lung dead." Death is death, independent of the means for determining it.

Upstairs Downstairs

Above, we looked at the two different ways that doctors can determine whether a person has died. The usual old-fashioned way is called determining death by cardio-respiratory criteria--no breath and no pulse. When a person dies outside a hospital these are the criteria almost always used. When a person is in the hospital, in intensive care or in the emergency room, sometimes these criteria don't work because the natural activity (or cessation) of the heart and lungs has been overtaken by machines. In these cases, doctors use brain criteria to determine death. Sometimes these patients are called "brain dead." They are not any less dead than someone whose death has been determined in the old-fashioned way.

There is another little wrinkle in this story that is important to know. The brain is a tremendously complex organ but one of the simpler things to understand about it is that it is divided into what scientists call the Upper Brain and the Lower Brain. Generally speaking, the Upper Brain is where all the "higher" functions of a person's nervous system take place. The capacities to see, hear, taste, smell and integrate experience ("feel") are in the Upper Brain. So are our personality, our intellect, our ability to reason, listen, recognize and speak. All the "good stuff" is Upstairs.

But wait a minute. What about our basic life functions? That's good stuff too, but it is Downstairs. The Lower Brain, which is actually the top of the spinal cord that goes up through our necks and into our brains, is where all those critical things that we **don't** think about take place. The Lower Brain governs spontaneous breath, our reflexes (including the gag reflex), our thermostat that keeps our temperature relatively constant, our wake/sleep cycles, our heartbeat. These functions are sometimes colorfully described as "vegetative functions," although I have never met a zucchini with wake/sleep cycles or a potato that actually breathes.

When a person experiences a brain injury, such as a trauma that bruises the brain, or a stroke where the brain bleeds, or a stroke where a blood vessel in the brain gets clogged, different parts of the brain may be affected, either Upstairs or Downstairs (or both). If the injury is severe enough Downstairs, where all the basic life functions are coordinated, the person simply dies. If the injury is Upstairs, however, a person can survive, but have one or more of these "higher" functions terribly impaired. The stroke victim may be able to understand language, but be completely incapable of talking. Or she may be completely unable to recognize people or speech, be unable to walk, talk, eat normally or take care of herself in any way. Sometimes, in fact, the injury is so severe that virtually ALL functions of the higher brain are gone, and are never coming back. In these cases, the person is in what is called a vegetative state, since only the Lower Brain, which governs the vegetative functions, is still at work.

Sometimes it is hard to tell right after a brain injury if the person is going to recover some of the higher brain functions. But after a while--six months to a year in an adult, longer in a child--doctors can determine that the vegetative state is permanent. Sometimes this is referred to as PVS, i.e., Permanent or Persistent Vegetative State. These patients breathe, open and close their eyes (although they don't "see" anything), have a normal temperature and have beating hearts. They usually reside in nursing

homes because their care is so demanding. They cannot move on their own, feed, bathe or toilet themselves, respond in any way to their surroundings, or recognize anyone or anything.

Here is the wrinkle that makes "brain death" as a term so confusing. Patients in PVS are sometimes **wrongly** called "brain dead." The reason that this is wrong is because "brain death" actually refers to death of the whole brain, Upstairs and Downstairs. When true whole brain death occurs, the person is taken to a morgue and prepared for burial, or taken to a surgical suite to have organs removed for transplantation. PVS is really only partial brain death, that is, the Upper Brain has totally and irreversibly stopped functioning. However, the person is not dead. We would never dream of taking them to the morgue, and removing their organs for transplantation would violate the "dead donor rule," which says that before a person can be an organ donor, that person must be dead.

The Silver Lining

Brain death is a somewhat confusing name for the subject, because it sounds as if the brain has died, but everything else is alive. This is of course not the case. “Brain death” is really just medical shorthand for “death of a person determined by neurologic tests rather than the failure of the heart and lungs, when the failure of heart and lungs is camouflaged by medical technology.”

The dark side of using brain tests to determine that a patient has died, when the rest of his body is still warm and pink because of medical machinery, is that it is very hard for the dead person’s loved ones to really see and believe that the person is dead. Particularly when the death has been a traumatic one, in a car accident for example, families and loved ones are shocked. This is the person who kissed me at breakfast, this is the person who left his bike in the driveway, this is the person who forgot his lunch on the way to school. **This** person is dead? It can’t be!

The silver lining behind this dark cloud, however, is that the same technology that makes it so difficult to see that the patient has died also makes it possible to keep his organs in good enough condition that another person could use them.

Some diseases attack a specific part of the body with terrible consequences. Hepatitis C, for example, attacks the liver, which is part of the body’s toxic waste department. So far there is no cure for this disease (although some people do recover from it). Usually, over time the liver simply ceases to work. A person with no functioning liver will die. Diabetes has many different manifestations but it sometimes takes a long-term toll on the kidneys, among other organs. The kidneys are also part of the toxic waste disposal system, and if both kidneys stop functioning, the person will die unless some other way to filter the toxins is found. In both cases, one way for the person whose organ is failing to survive is to undergo an organ transplant.

Organs like livers and kidneys, however, don’t grow on trees. So far no one has successfully invented an implantable substitute for them either. That means that the source of organs, like livers and kidneys, must be from the bodies of people who have died. **How** a person dies is important. Obviously, since the organ must be fresh, the person must have died very close to the time when the organ is transplanted. Livers and kidneys don’t keep very well or very long. Also, the death must be relatively quick for the organs still to be useful. When a person dies slowly, sometimes the organs themselves begin to break down as a result of whatever is killing the patient in the first place.

But a quick death, as we saw above, is the death that is the hardest for loved ones to accept. The cruel irony is that parents and loved ones of a person who has died suddenly, often traumatically, will be asked to let the dead person’s organs save the life of another when they have hardly even come to grips with the fact that the person they love is gone. It is a terrible anguish to lose someone suddenly. Sometimes the immediate denial loved ones naturally experience, or beliefs about the importance of the integrity of the body after death, or just plain aversion to the thought of organ removal makes a family say

no. Even if the person herself indicated, with a pink dot on a driver's license, for example, that she would want to give her organs in this way, when a family says no, the answer is no.

But even if every person who died suddenly whose organs were usable had families who said "Yes" to the removal of organs for transplantation, there still wouldn't be enough to meet all our the transplant needs. This is true for two reasons. First of all, on the supply side, the numbers are low. The number of people who die in this way is, thank heavens, not large to begin with. Also, the increase in the use of seatbelts by motorists and helmets by bike and motorcycle riders has paid off—fewer people die on the road. Furthermore, on the demand side, the numbers are high. The number of patients who are candidates for transplant is growing, partly because the technology to make transplants work has improved and partly because physicians are expanding the candidate pool to try to help those who would otherwise surely die. A shrinking supply and a growing demand—the recipe for a revolution.

If the silver lining behind the dark cloud of brain death is the hope of transplantation, the dark cloud lurking behind the silver lining of transplantation is the ever-increasing demand for organs. In a way, we can think of it as the pressure of success. No matter how many people agree to organ donation, there will never be enough to keep pace with the increased need. We are therefore always looking to widen the pool of transplantable organs, with some grisly results.

One suggestion, that met with resounding horror from the transplant community, was made by Dr Jack Kevorkian (of assisted suicide fame) early in his idiosyncratic career. He suggested that the organs of prisoners on death row be "harvested." Rather than send them to a gas chamber, he suggested, why not take them to surgery, remove their vital organs and let them die a painless death, giving something back to the society they damaged by their crime? Unfortunately for Jack, most physicians have a strong aversion to killing since they have dedicated themselves to the saving of lives. This aversion applies even to the killing of those society has determined should die (which is why doctors are never involved in capital punishment, except to declare death.) Since Kevorkian himself is free of this aversion, he miscalculated its chilling affect on the reception of his proposal, in the medical community and beyond.

Another interesting, if more fanciful, response to the perceived "shortage" of transplantable organs comes from a Scottish lamb named Dolly. Remember her? Scientists grew another whole lamb from the body cells of an already existing sheep, bypassing sexual reproduction altogether. This process is called cloning. Some hopeful folks believe that the technology of cloning may enable a new liver or kidney to be grown as a replacement part for a person who has worn out the first one. This solution may be some years away.

A final proposal, and one that is not years away (it has already been tested in certain parts of the country), comes from some transplant surgeons themselves. Their idea is the following. It is a long established right of patients to forgo medical treatment when the burdens of the treatment outweigh the benefits of it, even if it means the patient will die. (More on this subject later also.) Many patients who wish to forgo treatment do not have organ suitable for transplantation, but some do. If a patient may cease treatment and then die, why not ask those patients if, after they die, their organs may be given to

others? If they said yes, the procedure would be to sedate them (as is good medical practice when life-sustaining treatment is to be withdrawn from a patient who is expected to die), take them to surgery, orchestrate the machinery that will keep their organs in good condition, and THEN withdraw whatever life-sustaining intervention they wish to cease. Mechanical breathing would be the likeliest technology to stop, since death usually follows quickly.

The trouble is, death is unpredictable, even in patients who are expected to die. Sometimes withdrawing a machine doesn't result in the death of the person as quickly as would be necessary to keep their organs in transplantable condition. But the pressure would be enormous, wouldn't it? A dying person's wish that his organs be used to save someone, a surgeon ready to work hard to transplant, a person whose own organs have failed and who will die without a transplant—all of these could create the atmosphere where a likely death is speeded up, to meet a deadline, to work a miracle, to save a life. We could end up suspending, in practice, what the law calls the "dead donor rule," that is, the rule that the patient whose organs will be removed must meet the criteria for death **before** the transplant takes place. Worse, we could end up taking (or seeming like we are taking) organs from a person who, in the words of the Monty Python routine, "is not quite dead."

This last proposal to increase the pool of transplantable organs, because it is the nearest at hand and because the pressures are so great, is probably the most worrisome. Some families who are reluctant to authorize organ removal from their newly deceased loved one already think the patient isn't really dead. What will happen to the prospects for transplants from dead donors when the public finds out that you don't even need to be dead to be asked if you'd like to give the gift of life?