Brain death is an increasingly important condition in the intensive care unit. In this issue of the *Journal of Intensive Care Medicine*, Powner reviews the most important element of brain death: making an accurate diagnosis.

Specific protocols may vary from institution to institution. However, guidelines for brain death criteria in the United States have been firmly established by the report of the President's Commission [1]. In this formulation brain death is a clinical diagnosis with certain preconditions and confirmatory tests. The clinical criteria that form the core of the diagnosis are those that establish unresponsiveness and brainstem areflexia. Apnea testing is the most important of the tests of brainstem reflexes and should be done carefully, as Powner describes. The preconditions are primarily (1) that the cause of the coma be known and (2) that the cause be adequate to explain the coma. Drug intoxication, hypothermia, and other conditions must be excluded as much as possible. Confirmatory tests are in most cases the electroencephalogram or some test of blood flow, most recently isotope angiography. Blood flow tests are preferred if there is a question of drug intoxication.

Institutional tradition is continued within the guidelines for acceptable diagnosis. Given the general nature of the recommendations of the President's Commission, however, it is important that specific criteria be defined for each institution and for the critical care units within it. Each hospital's executive committee and legal counsel should approve the specific criteria as well. With the pluralistic medical care tradition of the United States, it is unlikely that a universally accepted set of criteria will be established nor is such standardization desirable; changes in technology will continually mandate guideline modification.

Three specific modifications of the Commission's guidelines have been adopted at our institution. If circumstances such as facial injury preclude testing of pupils and eye movements, an isoelectric electroencephalogram and apnea are considered adequate criteria. If the patient has been in barbiturate coma and the other criteria are met, a barbiturate level of less than 1 mg/ml is considered adequate to exclude drug intoxication. Finally, the criteria for diagnosing brain death in infants and children are the same as those for adults; however, at least one physician with expertise in this area should be consulted. These are somewhat arbitrary refinements of the criteria of the President's Commission, but they were necessary in their application at our hospital.

In our experience two types of patients provide the most practical difficulty: those who are approaching brain death and those who satisfy the criteria but are not declared dead. The patient approaching brain death presents several management problems. Should that patient have all support required to maintain blood pressure, urine output, and optimum intracranial pressure if it is likely that he or she will fulfill criteria for brain death within 24 hours? The answer will vary from patient to patient. The general principle, however, is that the patient should be treated like any other patient in deep coma until brain death criteria have formally been satisfied. In some situations this will mean maximum support, in others, a willingness to allow hypotension and cardiac arrest before criteria have been fulfilled. The guiding principle under current clinical ethics should be what the patient would have wanted to do or what a surrogate believes the patient would have wanted [2]. There are occasions where maximum support of blood pressure and urine output with fluids, even when this may increase already elevated intracranial pressure, is justified if the patient wished to be an organ donor or if the family wishes this for the patient.

A more difficult situation occurs when the family does not wish to accept brain death as an appropriate criterion of death. In theory, the diagnosis of death by brain criteria should be equivalent to the diagnosis by cardiac criteria. Few physicians would ask a patient's family whether they would object to turning off the ventilator after there has been irreversible cardiac arrest. However, a recent survey of neurologists and neurosurgeons indicated that at-
Attitudes are different with brain death [3]. The survey posed the question, “If a patient satisfies criteria for brain death but the family wishes to continue support, do you (1) declare the patient dead and stop ventilatory support anyway, (2) declare the patient dead and continue ventilatory support, or (3) not declare the patient dead, continuing ventilatory support?” Only 6% of respondents indicated they would stop the ventilator; 76% would maintain all support.

Present ambiguities associated with brain death therefore include not only the varied criteria outlined by Powner but the appropriate management of patients while criteria are being fulfilled or after they have been fulfilled. At the present time in the United States, the basic requirements for diagnosing brain death are becoming well accepted. Refining them and working through their implications for social and intensive care policy will be an ongoing process for years to come.

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References