Diagnosis of death----- Brain stem death

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The diagnosis and confirmation of death is required in a number of different situations, both as a result of a natural process and also in situations where artificial interventions are sustaining cardiorespiratory function in the absence of a patient's ability to breathe independently.

Diagnosis and confirmation of death

Death entails the irreversible loss of those essential characteristics which are necessary to the existence of a living human person and, thus, the definition of death should be regarded as the irreversible loss of the capacity for consciousness, combined with irreversible loss of the capacity to breathe.

- ***Death following the irreversible cessation of brainstem function***

- ***Death following cessation of cardiorespiratory function***

Scope

- *Development of Concepts*
- *Diagnosis of Brain Stem Death (BSD)*
  - *Preconditions*
  - *Testing brain stem function*
- *Implications*
  - *Organ donation*
- *Recent developments*
  - *Non-heart beating donation*

Diagnosing and confirming death after cardiorespiratory arrest

Whilst dying is a process rather than an event, a definition of when the process reaches the point (death) at which a living human being ceases to exist is necessary to allow the confirmation of death without an unnecessary and potentially distressing delay

The simultaneous and irreversible onset of apnoea and unconsciousness in the absence of the circulation

- ***Full and extensive attempts at reversal of any contributing cause to the cardiorespiratory arrest have been made.***
- ***Such factors, which include body temperature, endocrine, metabolic and biochemical abnormalities,***

The brain stem

- *The brain stem is the lower part of the brain that's connected to the spinal cord (part of the central nervous system in the spinal column).*
- *The brain stem is responsible for regulating most of the body's automatic functions that are essential for life. These include:*
  - *Breathing*
  - *Heartbeat*
  - *Blood pressure*
  - *Swallowing*
- *The brain stem also relays information to and from the brain to the rest of the body, so it plays an important role in the brain's core functions, such as consciousness, awareness and movement.*

Confirming death

- *Confirming death used to be straightforward. Death was said to occur when the heart stopped beating and a person was unresponsive and no longer breathing. The lack of oxygen, which occurred as a result of no blood flow, quickly led to the permanent loss of brain stem function.*
- *Confirming death is now more complex, because it's possible to keep the heart beating after the brain stem has permanently stopped functioning. This can be done by keeping a person on a ventilator, which allows the body and heart to be artificially oxygenated.*

How brain death occurs

- *Brain death can occur when the blood and/or oxygen supply to the brain is stopped. This can be caused by:*
- *cardiac arrest – when the heart stops beating and the brain is starved of oxygen*
- *heart attack – a serious medical emergency that occurs when the blood supply to the heart is suddenly blocked*
- *stroke – a serious medical emergency that occurs when the blood supply to the brain is blocked or interrupted*
- *blood clot – a blockage in a blood vessel that disturbs or blocks the flow of blood around your body*

Brain death can also occur as a result of:

- ***a severe head injury***
- ***a brain haemorrhage***
- ***infections, such as encephalitis – a viral brain infection***
- ***a brain tumour – when brain cells multiply abnormally and uncontrollably***

Conditions necessary for the diagnosis and confirmation of death

- ***Aetiology of irreversible brain damage***
- ***Exclusion of potentially reversible causes of coma***
- ***There should be no evidence that this state is due to depressant drugs***
- ***Primary hypothermia as the cause of unconsciousness must have been excluded***
- ***Potentially reversible circulatory, metabolic and endocrine disturbances must have been excluded as the cause of the continuation of unconsciousness***
- ***Exclusion of potentially reversible causes of apnoea***

The diagnosis of death following irreversible cessation of brain-stem function

- *Absence of brain-stem reflexes*
- *The pupils are fixed and do not respond to sharp changes in the intensity of incident light.*
- *There is no corneal reflex – care should be taken to avoid damage to the cornea.*
- *The oculo-vestibular reflexes are absent.*

- ***No motor responses within the cranial nerve distribution can be elicited by adequate stimulation of any somatic area.***
- ***There is no cough reflex response to bronchial stimulation by a suction catheter placed down the trachea to the carina, or gag response to stimulation of the posterior pharynx with a spatula.***

- ***The process for testing the respiratory response to hypercarbia (apnoea test) should be the last brain-stem reflex to be tested and should not be performed if any of the preceding tests confirm the presence of brain-stem reflexes.***

Repetition of testing

- *The diagnosis of death by brain-stem testing should be made by at least two medical practitioners who have been registered for more than five years and are competent in the conduct and interpretation of brain-stem testing.*

- ***The beating heart in individuals certified dead as a result of cessation of brain-stem reflexes***

- *Endocrine, metabolic and circulatory abnormalities*
- *Limb and trunk movements*
- *Investigations*
- *Peripheral neurological syndromes of intensive care*
- *The vegetative state*

Thank you