

Prognostication in Neurocritical Care: Just Crystal Ball Gazing?

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Karina Melchior, a 19-year-old Danish girl, was driving her car when she came off the road and crashed. She sustained severe traumatic brain injury. She was admitted to the intensive care unit in the Aarhus University Hospital, Denmark in a comatose state. Three days after admission, the physician determines that there was no hope for recovery and even informed the relatives that the girl may become brain dead. The CT scan images showed severe traumatic brain injury. She asked the parents' consent for organ donation. They consented, but Carina did not progress to brain dead. Then, the doctors decided that all life support should be withdrawn in order to let the young girl die. The ventriculotomy was removed, mechanical ventilation was stopped, and the endotracheal tube was removed. But, to the surprise of the parents, sister, and brother of the girl and the medical and nursing staff, the girl opened her eyes and started moving her arms and legs. In the following months, she made a good strides at a rehabilitation center. She has fully recovered; she walks, talks, is independent, rides her horse, and continued high school again. This all can be seen in the shocking documentary *Piggen der ikke ville dø* (The girl who wouldn't die) [1]. The documentary, that followed Carina's family from the moment she was admitted in the hospital, sparked a public debate in Denmark about organ donation, brain death, and withdrawal of life-sustaining treatment in cases of severe brain injury. Over 500 registered donors withdrew their consent in fear of being declared dead too soon.

To their credit, the doctors in the Aarhus Hospital have admitted that they made a grave error in prognostication.

A similar situation occurred in 2002, 34-year-old Jesper Bendixen was also wrongly assessed brain dead in the same hospital, after he was admitted for a severe traumatic brain injury. His relatives were also asked for organ donation, but Jesper also recovered. This documentary was also broadcasted in many other European countries.

What happened? Were there just incompetent doctors in Aarhus Hospital? Did they make a too early judgment? Is prognostication in neurocritical care still very difficult?

The report by Edlow et al. shows some of the challenges [2] with the unexpected recovery of a 19-year-old man who sustained a severe traumatic brain injury. The early MRI findings, suggested a poor prognosis. Despite the presence of severe axonal injury on early MRI, he regained the ability to communicate and perform activities of daily living independently a year after his surgery. The authors conclude in their report that MRI data should be interpreted with caution when prognosticating for patients with traumatic brain injury. What if the staff, based on the MRI findings, had decided to withdraw all life-sustaining measures when the patient was still in critical condition and dependent on mechanical ventilation? Most probably, he would have died. And, as this was to be expected seeing the severity of the injury as judged from the MRI images, nobody would have doubted the decision to withdraw support. We now know that this was nothing more than a self-fulfilling prophecy.

A self-fulfilling prophecy is a prediction that directly causes itself to become true, by the very terms of the prophecy itself. In critical care, predictions of poor prognosis may become self-fulfilling if life-sustaining measures as mechanical ventilation are withheld or withdrawn on the basis of that prediction. Patients are believed to have a high

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chance of dying after life-sustaining measures are withheld. That this is actually happening is described in patients with cerebral hypoxia [3], cerebral hemorrhage [4], neonatology [5], and intensive care medicine [6–8].

However that early DNR alone probably does not lead to a self-fulfilling prophecy in a cohort of patients with intracranial hemorrhage [9, 10]. But, withholding is something different from withdrawing.

Outcome may have—in certain situations—everything to do not only with the accuracy of the prognostication but also with how doctors and nurses act after this assessment. Does the prognostication impact the level of supportive medical care? In most cases, it will. Christakis cited in his book a critical care physician who told: “...if you come across as pessimistic to the housestaff, nursing staff, and others who are working with you, then they too may limit what they do, and so have a real impact on the whole approach to the patient” [11]. On the other hand many physicians will defend their unfavorable prediction that leads to death of the patient that it is really not so unfortunate.

When it comes to certain clinical conditions we may conclude that we are still gazing in a crystal ball. Our patients depend for survival on the life-sustaining measures. When we withdraw these, it must be based on careful considerations made by a multi-disciplinary team and nobody should jump to conclusions. There will always be patients like Carina Melchior and it will make us rethink and may even will make us humble, ashamed, and less convinced of ourselves. Prognostication in young individuals is fraught with errors but we need to know where to draw the line. We cannot continue to look into a crystal ball and families expect better from us.

References

1. The girl who wouldn't die <http://www.youtube.com/watch?v=4JRdkJ-zLm8> (English introduction) and <http://www.youtube.com/watch?v=kLid8mOzUcg> (whole documentary in Danish language).
2. Edlow BL, Giacino JT, Hirschberg RE, Gerrard J, Wu O, Hochberg LR. Unexpected recovery of function after severe traumatic brain injury: the limits of early neuroimaging-based outcome prediction. *Neurocrit Care*. 2013. doi:10.1007/s12028-013-9870-x.
3. Zandbergen EG, De Haan RJ, Stoutenbeek CP, Koelman JH, Hijdra A. Systematic review of early prediction of poor outcome in anoxic ischaemic coma. *Lancet*. 1998;352:1808–12.
4. Becker KJ, Baxter AB, Cohen WA, Bybee HM, Tirschwell DL, Newell DW, Winn HR, Longstreth WT. Withdrawal of support in intracerebral hemorrhage may lead to self-fulfilling prophecies. *Neurology*. 2001;56:766–72.
5. Mercurio MR. Physicians refusal to resuscitate at borderline gestational age. *J Perinatol*. 2005;25:685–9.
6. Cook D, Rocker G, Marshall J, Sjøkvist P, Dodek P, Griffith L, et al. Withdrawal of mechanical ventilation in anticipation of death in the intensive care unit. *NEJM*. 2003;349:1123–32.
7. Rocker G, Cook D, Sjøkvist P, Weaver B, Finfer S, et al. Clinician predictions of intensive care mortality. *Crit Care Med*. 2004;32:1149–54.
8. Sinuff T, Cook DJ, Rocker GM, Griffith LE, Walter SD, et al. DNR directives are established early in mechanically ventilated intensive care unit patients. *Can J Anaesth*. 2004;51:1034–41.
9. Jain AR, Jain M, Bellolio MF, Scheers RM, Rabinstein AA, Stead LG. Is early DNR a self-fulfilling prophecy for patients with spontaneous intra-cerebral hemorrhage? *Neurocrit Care*. 2013. doi:10.1007/s12028-013-9878-2.
10. Wilkinson D. The self-fulfilling prophecy in intensive care. *Theor Med Bioeth*. 2009;30:401–10.
11. Christakis NA. *Death foretold. Prophecy and prognosis in medical care*. Chicago: University of Chicago Press; 1999.