Neurological Sciences
https://doi.org/10.1007/s10072-020-04587-z

LETTER TO THE EDITOR

# Severe acquired brain injury and high specialty neurorehabilitation needs

Rita Formisano [1]

Received: 21 May 2020 / Accepted: 6 July 2020


The original definition of severe acquired brain injury (sABI), according to the Italian Guidelines of Rehabilitation, published in 1998, was the following: "a neurological condition due to a severe acquired brain damage with a coma lasting at least 24 hours, according to a Glasgow Coma Scale equal or lower than 8 and/or complex and severe neurological disabilities treatable only in high specialty neurehabilitative wards" [1].

Unfortunately, the national and local regional health policy has in the last years progressively restricted the inclusion criteria to be admitted in high specialty post-acute rehabilitation wards only to post-comatose patients, and in some Italian regions as example, even with persistent disorder of consciousness and specific cut off for the Disability Rating Scale and Level of Cognitive Functioning (Lazio Region Law 159, May 13th 2016). This means that a patient with a coma lasting at least 24 h in the acute phase should be necessarily more severely disabled than a patient with devastating or catastrophic stroke or other severe neurological disabilities, like Locked-in syndrome or Guillain Barré polyneuropathy [2]. Conversely, such complex clinical pictures actually require a multidisciplinary specific neurorehabilitative approach of high intensity, like in post-comatose patients.

Indeed, daily nursing should be specialized in the management of tracheal tube and enteral nutrition, in the monitoring of possible oxygen desaturations, frequent aspirations of tracheo-bronchial secretions, and respiratory and swallowing training, besides the neuromotor and cognitive-behavioral rehabilitation, this latter when needed. In particular, as for the neuropsychological training, only in highly specialized intensive post-acute neurorehabilitation wards such treatment is generally available.

In summary, the neurorehabilitation field needs a copernican revolution, where besides neuromotor rehabilitation, also highly specialized nursing, advanced diagnostic techniques, such as neuroimaging and neurophysiology, and the presence of a multidisciplinary staff, including intensivists, phoniatrists, pneumologists, cardiologists, urologists, neuropsychologists, physical therapists, speech, cognitive and occupational therapists, orthoptists, and caregivers psychological support, should be an unrenounceable requisite to be accreditated for admission of patients with severe neurological disabilities in high specialty neurorehabilitation wards. Efficiency and efficacy indicators of the high specialty neurorehabilitation units may be represented by the improvement rate of the disability scales commonly used in patients with sABI from admission to discharge in the neurorehabilitation units [3]. Indeed, it is not acceptable that only being post-comatose and even worst with prolonged disorders of consciousness, such as vegetative state, more recently defined as unresponsive wakefulness syndrome [4] or minimally conscious state could be considered the unique requisite to merit the admission in high specialty neurorehabilitation hospitals.

Although this policy trend seems to interest only some European countries, such as Italy, a cross-sectional survey among the different countries, on this topic, could be of some interest.

On the other hand, the trend to admit patients in post-acute rehabilitation wards even earlier from intensive care units, neurosurgery wards and stroke units, is already shared worldwide with its challenges [5, 6].

According to recent evidence [7], if the clinical complexity of patients with sABI, defined as post-comatose patients, has been extensively reported, the issue of clinical comorbidities requiring elevated care assistance in patients diagnosed with sABI, without coma in the acute phase, may be underestimated. In fact, in recent years, a reduction in the duration of acute-phase hospital stays, per episode of care, has inevitably resulted in longer stays in post-acute care facilities [8]. Discharging patients "quicker and sicker" has a

✉ Rita Formisano
r.formisano@hsantalucia.it

[1] Post-Coma Unit, IRCCS, Santa Lucia Foundation, Rome, Italy

Published online: 16 July 2020

significant impact on the scope for applying more aggressive rehabilitation in patients with functional limitations, because of the general conditions and medical or surgical complications of "sicker" patients. In fact, although shorter hospital stays do not seem to have had a negative effect on mortality, it would be more meaningful to measure their impact on disability [8]. Aspects to consider with regard to lower-resource settings, such as post-acute care facilities, are their lower risk of iatrogenic harm, and also their safety, but it is also necessary to evaluate how safe it is to transfer patients with unstable vital functions to such settings, and how likely it is that the iatrogenic risk will be spread to post-acute care facilities. Indeed, patients with more severe and complicated clinical pictures, discharged from intensive care units (ICU), often require increasing rates of emergency department visits, aggressive antibiotic therapies, and even longer stays in post-acute care facilities; in addition, recurrent medical complications can make it difficult to apply more intensive rehabilitation in these patients [5]. Furthermore, in the measurement of home-to-home time for patients with complex conditions, the rate of hospital readmissions and the final outcomes should also be taken into account [5].

To conclude, although the knowledge of clinical complexity of sABI patients is important, it is to underline that international recommendations on admission criteria of patients with sABI to post-acute rehabilitation settings should be mandatory, according to the Italian Consensus Conference on transfer criteria [9].

Finally, the reduction of acute hospital stays applied by Medicare in the past 30 years not only in the USA [8] but also in other countries [10–12] has profound implications for the costs and efficacy of post-acute rehabilitation facilities, which are rarely properly recognized and economically supported by national public health system [6].

The final questions are "how should be safer and more efficient the availability of rehabilitation professionals in ICU instead of discharging even more patients with sABI quicker and sicker?" and "are we sure that this trend would not increase the severity of the final disability?"

## Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

**Ethical approval** None.

**Research involving human participants and/or animals** None

**Informed consent** None

## References


1. Linee Guida del Ministero della Sanità, L. G. D. M (1998) per le Attività di Riabilitazione. Gazzetta Ufficiale della Repubblica Italiana, Serie Generale, (124). https://www.gazzettaufficiale.it/eli/id/1998/05/30/098A4518/sg Accessed 12/11/2019
2. Formisano R (2019) The need for broader admission criteria for high specialty neurorehabilitation wards in the Italian Health System: not only post-comatose patients. Funct Neurol 34(3): 205–206 PMID:32454002
3. Formisano R, Contrada M, Aloisi M, Buzzi MG, Cicinelli P, Della Vedova C et al (2018) Improvement rate of patients with severe brain injury during post-acute intensive rehabilitation. Neurol Sci 39(4):753–755. https://doi.org/10.1007/s10072-017-3203-3
4. Laureys S, Celesia GG, Cohadon F, Lavrijsen J, León-Carrión J, Sannita WG et al (2010) Unresponsive wakefulness syndrome: a new name for the vegetative state or apallic syndrome. BMC Med 8(1):68. https://doi.org/10.1186/1741-7015-8-68
5. Formisano R, Azicnuda E, Sefid MK, Zampolini M, Scarponi F, Avesani R (2017) Early rehabilitation: benefits in patients with severe acquired brain injury. Neurol Sci 38:181–184. https://doi.org/10.1007/s10072-016-2724-5
6. Formisano R, Contrada M, Aloisi M (2018) Shorter acute care hospital stay, longer stay in post-acute care facilities. Funct Neurol 33:65. https://doi.org/10.11138/FNeur/2018.33.2.065
7. Scarponi F, Zampolini M, Zucchella C, Bargellesi S, Fassio C, Pistoia F, Bartolo M, C.I.R.C.LE (2019) Identifying clinical complexity in patients affected by severe acquired brain injury in neurorehabilitation: a cross sectional survey. Eur J Phys Rehabil Med 55:191–198. https://doi.org/10.23736/S1973-9087.18.05342-X
8. Barnett ML, Grabowski DC, Mehrotra A (2017) Home-to-home time-measuring what matters to patients and payers. Engl J Med 377(1):4–6. https://doi.org/10.1056/NEJMp1703423
9. Taricco M, De Tanti A, Boldrini P, Gatta G (2006) National Consensus Conference. The rehabilitation management of traumatic brain injury patients during the acute phase: criteria for referral and transfer from intensive care units to rehabilitative facilities (Modena June 20-21, 2000). Eura Medicophys 42(1):73–84
10. Guterman S, Dobson A (1986) Impact of the Medicare prospective payment system for hospitals. Health Care Financ Rev 7(3):97–114 PMID: 10311499
11. Coulam RF, Gaumer GL (1992) Medicare's prospective payment system: a critical appraisal. Health Care Financ Rev 1991(Suppl): 45–77 PMID: 25372306
12. Morrisey MA, Sloan FA, Valvona J (1988) Shifting Medicare patients out of the hospital. Health Aff 7(5):52–64. https://doi.org/10.1377/hlthaff.7.5.52