ACRM
AMERICAN CONGRESS OF REHABILITATION MEDICINE

Archives of Physical Medicine and Rehabilitation

journal homepage: www.archives-pmr.org

Archives of Physical Medicine and Rehabilitation 2013;94:1870-6

ORIGINAL ARTICLE

Rationale and Design of the Prospective German Registry of Outcome in Patients With Severe Disorders of Consciousness After Acute Brain Injury

Eva Grill, PhD,[a,b] Anke-Maria Klein, MSc,[c] Kaitlen Howell, BSc,[c,d] Marion Arndt,[d] Lydia Bodrozic,[d] Jürgen Herzog, MD,[e] Ralf Jox, MD,[f] Eberhardt Koenig, MD,[g] Ulrich Mansmann, PhD,[a] Friedemann Müller, MD,[g] Thomas Müller, MD,[a] Dennis Nowak, MD,[h] Matthias Schaupp, MD,[i] Andreas Straube, MD,[c] Andreas Bender, MD[c,d]

From the [a]Institute of Medical Information Processing, Biometry and Epidemiology, University of Munich, Munich; [b]Integrated Center for Research and Treatment of Vertigo, Balance and Ocular Motor Disorders (IFB[LMU]), University of Munich, Munich; [c]Department of Neurology, University of Munich, Munich; [d]Therapiezentrum Burgau, Burgau; [e]Schön Klinik München-Schwabing, Munich; [f]Institute of Ethics, History and Theory of Medicine, University of Munich, Munich; [g]Schön Klinik Bad Aibling, Bad Aibling; [h]Klinik Kipfenberg, Kipfenberg; and [i]Neurologische Klinik, Bad Neustadt a. d. Saale, Germany.

Abstract

Objective: To describe the rationale and design of a new patient registry (Koma Outcome von Patienten der Frührehabilitation—Register [KOPF-R; Registry for Coma Outcome in Patients Undergoing Acute Rehabilitation]) that has the scope to examine determinants of long-term outcome and functioning of patients with severe disorders of consciousness (DOC).

Design: Prospective multicenter neurologic rehabilitation registry.

Setting: Five specialized neurologic rehabilitation facilities.

Participants: Patients (N=42) with DOC in vegetative state or minimally conscious state (MCS) as defined by the Coma Recovery Scale—Revised (CRS-R) after brain injury. Patients are being continuously enrolled. The data presented here cover the enrollment period from August 2011 to January 2012.

Interventions: Not applicable.

Main Outcome Measures: CRS-R, FIM, and emergence from MCS.

Results: The registry was set up in 5 facilities across the state of Bavaria/Germany with a special expertise in the rehabilitation of acquired brain injury. Inclusion of patients started in August 2011. Measures include sociodemographic and clinical characteristics, course of acute therapy, electrophysiologic measures (evoked potentials, electroencephalogram), neuron-specific enolase, current medication, functioning, cognition, participation, quality of life, quantity and characteristics of rehabilitation therapy, caregiver burden, and attitudes toward end-of-life decisions. Main diagnoses were traumatic brain injury (24%), intracerebral or subarachnoid hemorrhage (31%), and anoxic-ischemic encephalopathy (45%). Mean CRS-R score ± SD at admission to rehabilitation was 5.9±3.3, and mean FIM score ± SD at admission was 18±0.4.

Conclusions: The KOPF-R aspires to contribute prospective data on prognosis in severe DOC.

Archives of Physical Medicine and Rehabilitation 2013;94:1870-6

Supported in part by the Hannelore-Kohl-Stiftung, Germany (grant no. 2011013 to AB) and the Deutsche Stiftung Neurologie, Germany.

No commercial party having a direct financial interest in the results of the research supporting this article has conferred or will confer a benefit on the authors or on any organization with which the authors are associated.

Disorders of consciousness (DOC) presenting as coma, vegetative state (VS), or minimally conscious state (MCS) are consequences of severe traumatic (TBI) or nontraumatic brain injury (NTBI)—for example, anoxic-ischemic encephalopathy (AIE) or subarachnoid

0003-9993/13/$36 - see front matter © 2013 by the American Congress of Rehabilitation Medicine
http://dx.doi.org/10.1016/j.apmr.2012.10.040

hemorrhage (SAH). The term unresponsive wakefulness syndrome was proposed instead of VS to avoid labeling or a notion of therapeutic nihilism.[1] This state includes patients who are unresponsive to external stimuli but show signs of being wakeful such as eye opening. Patients may evolve from coma to unresponsive wakefulness or to MCS and beyond; however, each state may also persist.

To forecast the long-term DOC outcome is a challenge for health care professionals in the intensive care as well as in the neurologic rehabilitation settings. However, a reliable prognosis of the long-term outcome of TBI or NTBI is needed for next-of-kin counseling and medical decision-making in the acute phase. This situation carries an ethical dilemma. Outcome assumptions that are too negative may lead to unjustified withdrawal of life-sustaining therapy (LST), resulting in self-fulfilling prophecy.[2] Unrealistically positive expectations may negatively affect family members in the process of coping, acceptance, and mourning.

For almost 2 decades now, the 1994 consensus statement of the Multi-Society Task Force on VS has been the basis for prognosis for those patients who do not regain consciousness within 1 month after acute brain injury.[3] It was concluded that VS can be considered permanent in patients with TBI after 12 months and in patients with NTBI after 3 months. This view has recently been challenged; patients who had been in VS for more than 6 months can still recover responsiveness.[4]

Recent data from a prospective outcome study[5] showed that up to 68% of patients with TBI who have DOC may recover consciousness during the course of inpatient neurorehabilitation, and that further functionally relevant improvements may take place in the following years. Also, it has been shown recently that patients admitted to rehabilitation in an unresponsive state can show considerable recovery even after a prolonged time.[5,6] Although complete functional independence cannot be expected, this is not necessarily a prerequisite for quality of life (QOL) (eg, in locked-in patients).[7] Thus, a decision to continue or withdraw LST and to conduct or withhold specialized neurorehabilitation in vegetative TBI or NTBI survivors cannot merely be based on the prospect of future functional independence. Still, there is a profound lack of data on long-term outcomes of DOC taking into account initial prognostic factors, therapy modalities, and attrition rate.

List of abbreviations:

AIE	**anoxic-ischemic encephalopathy**
CI	**confidence interval**
CRS-R	**Coma Recovery Scale—Revised**
DOC	**disorders of consciousness**
EEG	**electroencephalogram**
ICU	**intensive care unit**
KOPF-R	**Koma Outcome von Patienten der Frührehabilitation—Register [Registry for Coma Outcome in Patients Undergoing Acute Rehabilitation]**
LST	**life-sustaining therapy**
MCS	**minimally conscious state**
NSE	**neuron-specific enolase**
NTBI	**nontraumatic brain injury**
QOL	**quality of life**
SAH	**subarachnoid hemorrhage**
SEPs	**somatosensory evoked potentials**
TBI	**traumatic brain injury**
VS	**vegetative state**

Based on these limitations of the current data regarding the long-term outcome of patients with DOC, we established a prospective registry for patients who are either in a VS or an MCS on admission to specialized neurorehabilitation centers. The objective of the registry is to examine determinants of long-term outcome and functioning of patients with severe DOC. We hypothesize that this new prospective database will further our understanding of the rehabilitation potential of the most severely affected patients with DOC. We also hypothesize that there is potential for some level of recovery despite the presence of strong unfavorable prognostic markers. In this article, we present the rationale and design as well as the first experiences with the initial phase of the registry.

Methods

Design and setting

The KOPF-R (Koma Outcome von Patienten der Frührehabilitation—Register; Registry for Coma Outcome in Patients Undergoing Acute Rehabilitation) is a prospective registry intended as a clinical database of the characteristics, management, and functional and QOL outcomes of patients with severe DOC (either VS or MCS) after brain injury across the state of Bavaria/Germany. The 5 participating facilities (Therapiezentrum Burgau, Schön Klinik München-Schwabing, Schön Klinik Bad Aibling, Klinik Kipfenberg, Neurologische Klinik Bad Neustadt/ Saale) are rehabilitation facilities with a special expertise in the rehabilitation of brain injury. The 5 study sites are among the largest specialized centers for neurologic rehabilitation in Bavaria with a total of 420 inpatient beds for early acute rehabilitation. They were selected based on their patient intake and represent the major geographic regions of Bavaria. Analysis of admission statistics over the past 5 years suggests that the centers might enroll approximately 300 suitable patients annually.

A positive vote of the local institutional review board was obtained before starting. Informed consent was obtained from each patient's legal surrogate. Whenever patients regained consciousness and were formally considered to be contractually capable, they were asked for informed consent for further long-term study follow-up.

Patients and data collection

The registry includes patients with acute DOC resulting from acute brain injury presenting as coma, VS, or MCS at the time of admission to a participating rehabilitation center and immediately after intensive care treatment. Entry into the registry does not depend on specific diagnoses but on the level of consciousness as defined by the Coma Recovery Scale—Revised (CRS-R).[8] Specifically, the registry includes those most severely affected patients where discontinuation of specific medical care or life-supportive care may have been discussed on the intensive care unit (ICU). Patients are admitted for rehabilitation irrespective of the results of initial prognostic markers, wherever possible and appropriate. All colleagues who are making transfer decisions in ICUs of the relevant acute care facilities are encouraged to transfer patients for rehabilitation if this is supported by the families. The enrolled sample is to be representative in this sense. The main exclusion criterion is application of continuous intravenous sedative drugs (eg, benzodiazepines, propofol) for artificial therapeutic coma.