percutaneous stimulation of cauda equina was performed by a pair of self-adhesive percutaneous electrodes placed over the skin of the projection of the first and third lumbar interspinous space (anode) and pair of percutaneous electrodes placed over the abdomen skin one on either side of the umbilicus (cathode). The two electrodes of each pair were connected by jumper as used as a single electrode. A paired stimuli of identical parameters are used with an interstimulus interval of 50 ms and duration of 0.5-1 ms. The recording electrodes for PRMR and ARMR were identical as electrodes used for recording MEPs over lower limb muscles.

Results
Recording baselines were successful in all patients with all four techniques and detection of significant changes occurred in eight patients (8/30, 26.6%) in one or more parameters of multimodal evoked potentials. In six patients (6/30, 20%) changes were reversible and in two (2/30, 6.7%) the changes were irreversible correlating with the postoperative neurological deficit.

Conclusions
Multimodal IOM techniques allow to identify the moment and the maneuver which may damage nerves or roots before an irreversible injury occurred and/or avoid permanent postoperative neurological deficits. PRMR and ARMR could emerge as new intraoperative monitoring techniques to assess the functional integrity of lumbosacral plexus and nerves. These new techniques have potential to give more specific information of integrity of lumbosacral roots and nerves than MEPs and SEPs.

Oral 23

Accountable Care vs Quality Care! Can IOM Prove Its Value Proposition?

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Significant changes are affecting the American system of providing medical care and how that care is being paid for. The objective is to create a Quality-Driven structure that enhances patient satisfaction and contains costs. The Accountable Care Organization (ACO), mandated for all Medicare patients by 2012, has come into play as a result of the Patient Protection and Affordable Care Act (PPACA). These will significantly impact intraoperative Neurophysiological Monitoring (IONM) services delivered in the United States and will vary likely impact IOM service delivery worldwide. The Patient-Centered Medical Home (PCMH) lies at the core of controlling population health, and integrated/coordinated care. PCMH consists of a care healer or provider (the so-called foundation to care that is accountable) who leads an organization that delivers comprehensive, accessible, holistic, coordinated, and evidence-based coordination and management of total care. This controls the services delivered to patients in a PCMH program including what surgical procedures are available and what ancillary procedures (e.g., IONM) may also be available to the patient. Evidence suggests this approach may create a significant conflict of interest and potential for substandard patient care by incentivizing the primary care healer to reduce costs for all patients’ services. Doctors are being called upon to identify at least five tests and medical treatments, where savings could be made. IONM needs to do the same in assessing the Quality of services we provide. We must develop primary statements of the value of our services and be willing to admit that not all monitoring we do is necessary. Ethically, this is a statement of professionalism that we cannot simply pursue business as usual, and that changes are needed in how we practice neuromonitoring. The Value Proposition of Neuromonitoring, like in all aspects of medicine, is comprised of a triangle with Quality at the peak and Service and Efficiency on the base. The merger of these three primary characteristics, create the Value Proposition. We cannot separate the delivery and quality of health care delivered from the cost of that delivery. Thus, it becomes incumbent upon us, as neuromonitoring professionals, to develop appropriate support for our Value Proposition. We must be dedicated to continuous improvement in the Quality of services we offer. This commitment entails maintaining clinical competence, working collaboratively with other professionals to reduce medical error, increase patient safety, minimize overuse of monitoring resources, and optimize the outcomes of care. We must actively participate in the development of better measures of Quality of care and their applications to assess the performance of all providers, institutions, and systems responsible for neuromonitoring services delivery. This presentation will address the Value Proposition, the methods that must be implemented to prove the Value of Neuromonitoring and how practitioners worldwide must demonstrate the importance of our services based upon evidence-based medicine.

Oral 24


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Introduction
Therapeutic attempts for the patients in vegetative state (VS) and minimal conscious state (MCS) include electrical stimu-
loration of deep brain structures (deep brain stimulation-DBS) with implanted electrodes primarily in the thalamic nuclei of the reticular formation. So far around 60 patients with VS have been documented in the world literature who underwent this therapeutic approach [1,2]. Unfortunately, all patients except one were in longer lasting chronic form of VS and only one reported patient after DBS become ambulatory [2]. The therapeutic effect was moderate and only in those patients who fulfilled neurophysiologic, neuroradiologic and clinical criteria.

Objective
To present the results of the DBS for the early treatment of MCS caused by hypoxic encephalopathy.

Patient and Methods
17 years old boy sustained cardiac fibrillation with resuscitation within 5-7 minutes, followed by coma for a month, myoclonions of trunk and head with severe limb spasticity. After the coma the patient regained in VS for 35 days, following 10 days in MCS. He was selected for DBS on the basis of following criteria: clinical (MCS caused by ischemic encephalopathy), neurophysiologic (multimodal evoked potentials and 24 hours of EEG), neuroimaging (MRI, PET). DBS was performed with electrode implanted into the parafascicular part of left thalamic intralaminar nuclei.

Results
One month after beginning of DBS the patient regained consciousness, walks with help, receives liquid meals, remained unable to speak, but showing impressive speech comprehension. Myoclonions and spasticity completely disappeared. After two months the patient climbs the stairs independently, pronounces simple words, and controls sphincter. After three months he runs and walks in the street independently and communicates with simple sentences. Five months after DBS he rides the bike, takes care of himself, getting out and enjoys life. He has still trouble in expressive speech, but further rehabilitation is on the way.

Conclusions
The DBS is not yet "evidence-based treatment" of the VS and MCS. This report indicates that if the patient fulfills neurophysiologic, neuroimaging and clinical criteria he should be treated with DBS at an early stage of MCS. Further studies are needed to confirm efficacy of this approach in the early treatment of VS and MCS. References: [1] Cohadon F & Richer E. Neurochirurgie 1993: 39:281-292. [2] Yamamoto T et al. European Journal of Neuroscience 2010; 32: 1145-1151.

Intraoperative microrecordings' considerations from one “off label” deep brain stimulation target: the posterior nucleus of the hypothalamus

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Background
Intraoperative microrecordings to map the boundaries of the subthalamus, thalamus and globus pallidus, are a well-established procedure in functional neurosurgery, increasing the accuracy of the placement of the deep brain stimulation leads, thus improving the clinical outcomes. At today new anatomical structures, besides the above quoted nuclei, have been targeted with the aim to control symptoms in several neurological and psychiatric pathologies (i.e. chronic pain, aggressiveness, obsessive-compulsive disorder). In these latter procedures microrecordings might represent a promising tool but a few data have been published. Due to the scarcity of data the aim of this report is to describe the state of the art of microrecordings in one of the so called “off-labels” targets, namely the posterior nucleus of the hypothalamus (pHyp).

Methods
Single unit activity was sampled in patients suffering from chronic cluster headache, and aggressive behavior. 3D trajectory’s reconstruction has allowed us to identify with a convinced accuracy the location of the sampled neurons. Spontaneous firing rate and firing discharge were studied. To assess the periodicity of the firing discharge autocorrelograms and power spectra were plotted to perform respectively, a time-domain and a frequency-domain analyses.

Results
The increasing of the background noise and the occurrence of action potentials (APs) is the signature that the microelectrode is entering in a nucleus. The lack of APs associated to a poor background noise represents that the microelectrode is passing through fibers. In posterior hypothalamus firing discharge and pattern might be linked to the underlined pathology, and were different from the more rostrally thalamic cells. During wakefulness pHyp neurons displays tonic firing discharge at around 20Hz, while during sedation is around 10Hz and the firing pattern more variable. In aggressive behaviour and epilepsy the firing discharge is phasic and rhythmic with oscillations locked at around 7-8Hz. Regular and irregular tonic discharge is noticed in aggressive behaviour and head injury. Spontaneous activity in awake TACs patients is similar to what has been reported in animal models. Interestingly, in aggressive behaviour with epilepsy the observed pattern is bursting and rhythmic at around 7-8Hz.

Conclusions
Microrecordings were helpful to investigate the anatomical structures encountered, and specifically to map the bounda-