

The “PRM care pathways” are short documents, aiming to describe in a strong and precise manner what PRM care can offer patients, i.e. why and how our competencies and those of our team of rehabilitation professionals should be proposed to patients and integrated around their life project. They describe for each type of patients their specific pathology-related needs, place and objectives of PRM care, human and material resources needed as well as a proper time line and expected outcomes.

These pathways bring two novelties: description of the whole pathway of a patient; an approach based on the consequences instead of the pathology. The proposal is to group patients relating to their deficiencies (paresis, pain, aphasia...) and personal and environmental factors according to the International Classification of Functioning (WHO). These last parameters are likely to modify the means to be provided for the same objectives.

Depending on the complexity of the situation, the PRM care pathways are declined into two ways:

– type 1 (Stroke, Traumatic brain injury [TBI], Spinal cord injury [SCI]) relating to the severity of the deficiencies. Then 4 categories are proposed for Stroke, 3 for TBI and 5 for SCI;

– type 2 (rotator cuff tear surgery, knee ligamentoplasty, hip arthroplasty, knee arthroplasty): by stage of care after a simple act, mostly surgical, declined into two situations relating to the medical complexity.

These pathways were given a warm welcome by many of our partners, as the National Direction for Care, the Union for the management of the social insurance' facilities, the Federation of French Hospitals.

This approach, broaden to the others medical specialties of the following care facilities could be the basis for the conception of a new medico-economic tool, in the view of the new financing to be applied in France, by creating homogenous groups of patients, really descriptive of the needs, without being obliged to use a detailed quantitative description of the acts.

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### An adaptive signal processing model for neurological recovery

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**Keywords:** Theoretical model; Adaptive signal processing; Neurological rehabilitation

In this article, we will apply a classical Adaptive Signal Processing model (ASP) to neurological recovery. This work is the result of a two-fold experience: in the field of ASP in telecommunications, plus 15 years of experience in neurological rehabilitation. Unlike traditional studies, which derive SP algorithms from bio-inspired examples, in this article we shall apply ASP to neurological rehabilitation. The application of this type of theory to the problem of neurological rehabilitation, which is considered to be an adaptive process, subject to various assumptions and considerations, will be detailed in the body of this article. It enables us to shed new light on this type of therapeutic practice and neuroplasticity, and deduce a certain number of practical conclusions.

The model is based on the hypothesis that rehabilitation as such is the sum of a very large number of elementary rehabilitations (a function or movement, for instance), each of which corresponds to an adaptive model. In this article, we assume that adaptation follows a very typical stochastic gradient algorithm: this minimises a function known, in conventional ASP, as the Mean Squared Error. In this case we obtain the well-known Least Mean Square (LMS) algorithm, in which there is an error which will be taken here as the error between the result obtained and the “nominal” function.

Like any stochastic gradient algorithm, the convergence speed and precision (residual error, known in this context as a sequela) are governed by a convergence step.

Finally, we will draw a certain number of conclusions that are typical in ASP but also relevant in terms of neurological rehabilitation. Among these, the following will be discussed:

– convergence/recovery speed;

- transitional regime/rapid recovery phase;
- stationary regime/stationary phase;
- local minima/states of incomplete recovery;
- residual error/sequelae;
- convergence stability/stability in the patient's condition;
- time taken to reach a level of residual error/time taken to reach a level of recovery/theoretical limit of neurological recovery. The main conclusion is that there is no theoretical limit to the neurological rehabilitation. The sole limit is the one given by the patient and/or the therapist, in all conscience.

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### Nutritional status of patients in Physical and Rehabilitation Medicine (PRM) units

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**Keywords:** Undernutrition; BMI; PRM

**Introduction.**– Nutritional status is a formal quality indicator in post-acute care units to screen for frequently encountered undernutrition.

**Objectives.**– Analyse Body Mass Index (BMI) registered at admission and each fortnight. Search for correlations between BMI and patients markers in a PRM unit specialised in musculoskeletal system disease.

**Patients and methods.**– The study involved inpatients in the PRM unit between September and November 2011. Patients were classified into 4 groups: low BMI < 18 kg/m<sup>2</sup>, normal 18–25 kg/m<sup>2</sup>, overweight 26–30 kg/m<sup>2</sup> and obese > 30 kg/m<sup>2</sup>. In each group, average age and average duration of the stay (DoS) were recorded.

**Results.**– Sixty-eight patients had a musculoskeletal disease. The average age was 62.7 years. DoS was 25.7 days. The distribution by BMI category was: low ( $n = 0$ ), normal ( $n = 16$ , 23%, mean age 60 years, DoS 24.3 days), overweight ( $n = 28$ , 41%, mean age 61.8 years, DoS 26.5 days), and obese ( $n = 24$ , 35%, mean age 66.6 years, DoS 24.4 days). The C-reactive protein level, monitored during the postoperative period, normalized in all cases before day 30.

**Discussion.**– In this PRM musculoskeletal unit, there were no undernourished patients. This public health problem in geriatrics was not found to be a PRM problem, but overweight affected 76% of patients.

The obese subjects were the oldest. The DoS was the same in three groups. Analysis of other indicators of nutritional status disclosed a normal CRP. Albuminaemia is not systematically assayed.

**Conclusion.**– Excess weight was a frequent finding (76% of patients), however there were no subjects with low BMI. Work on overweight patients is in progress. The BMI had no impact on the average duration of hospital stay. The study should be completed by research on biological signs of undernutrition.

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### Antibiotherapy for urinary tract infections in patient with spinal cord or brain injury: Impact of a professional practices' clinical audit

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**Keywords:** Urinary tract infection; Antibiotics; Spinal cord injuries; Brain injuries; Clinical audit

**Introduction.**— Patients with neurological bladder dysfunction develop urinary tract infections (UTI) which can be very concerning considering their frequencies, severity and resistances to antibiotics (ATB) [1]. A professional practice assessment (PPA) began in 2009 through a clinical audit [2], followed by the diffusion of guidelines. A second audit has been carried out to assess the impact of guidelines (2011).

**Patients and methods.**— A two-month prospective study was conducted in the 7 neurological rehabilitation clinical units. Data collection included information about patient, infection and ATB. The evaluation criteria were: initial empiric ATB choice, dosage, ATB reevaluated after 72 h according to antibiogram (for empiric treatment), ATB duration. The compliance rate of these criteria was analyzed and compared with results of the previous audit (by comparison of proportions' test when patients' number allowed it).

**Results.**— Thirty-eight patients were included in the study ( $47 \pm 15$  years). Fifty-two percent of patients had neurogenic bladder. Patients were treated for bacterial colonization before an invasive procedure (32%), for prostatitis (42%) or for a simple urinary tract infection (26%). The initial treatments were empiric in 26% of cases. The initial choice of ATB was not suitable for 21% of prescriptions (vs. 45% in 2009,  $P < 0.05$ ). Ninety-two percent of patients received the right antibiotic dose (vs. 94%, ns). Empiric treatments were reevaluated at 72 h in 60% of cases (vs. 92% in 2009). Finally, treatment durations were not respected in 26% of cases (vs. 52%,  $P < 0.05$ ).

**Discussion.**— There is a positive evolution in professional practice, including treatment durations and choice of ATB more adapted compared to the 2009 audit. However, the reassessment of empirical treatment is insufficient, even though it is a major criterion for quality monitoring in the HAS' recommendations. The implementation of simple indicators with monthly monitoring is the next step; as it will help to perpetuate our work.

#### References

- [1] J Hosp Infect 2006; 62:473–9.
- [2] 39th European Symposium of Clinical Pharmacy, Lyon, 2010.

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### **Klebsielle pneumoniae carbapenemase productive epidemic in a PRM department**

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**Introduction.**— We had to face an epidemic of “*Klebsielle Pneumoniae Carbapenemase productive*” (KPC), a negative Gram bacillus with a high acquiring and diffusing resistance capacity. The drastic organization needed during 8 months is described.

**Method.**— Bacillus was found in 2 patients coming from neurosurgery. From this day (02/02/2011), the following measures have been applied:

- crises centre including hygiene committee of Paris Nord and AP–HP, direction and hygiene teams of the hospital, physicians, nurses and rehabilitation teams;
- suspension of the admission for 15 days;
- reorganization of the department with 2 sectors for contaminated patients and for suspects of carrying bacillus, then a third one “unaffected” with new patients;
- geographic and chronologic reorganization of the rehabilitation;
- strict isolation in bedroom for contaminated patients (dedicated team, rehabilitation in bedroom)...
- for each present patient at this time, considered as “contact”, a weekly rectal swab, twice per month from august, till discharge even when the were negative; they benefited from specific measures for “resistant bacillus” contaminated patients.

**Results.**— Forty-four patients were concerned; among them 4 “contaminated”. Only one diagnosed among contact and one being admitted, team aware of

contamination. Return to a normal situation after discharge of the last patient (26/09/11) with this cost: 543 rectal swab; 388 unavailable days for inpatients; 382 days of additional nursing staff; 11 meeting of the crisis centre; increase of the length of stay related to difficulties with discharge of these patients; lack of 15 admissions compared with previous years; high psychological impact.

**Conclusion.**— Fighting against such epidemic in a PRM department is difficult and needs strictness leading to psychologically painful isolation, lack of change in rehabilitation and a high financial cost. We have to be prepared for such increasing problem.

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### **A prevalence of second-look diagnoses in the post-acute rehabilitation setting: A new challenge?**

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**Keywords:** Second-look diagnoses; Rehabilitation

**Purpose.**— Post-acute care rehabilitation is in full development. Indeed, the evolution of health systems aims towards an important reduction of hospital stay and towards an earlier referral of patients with severe conditions. This study aimed to measure the prevalence of diagnoses made only during the post-acute rehabilitation phase (the so-called “second look” diagnoses).

**Methods.**— Patients hospitalized in a post-acute care rehabilitation unit. Retrospective study over one year using the patients' electronic medical charts. The second-look diagnoses made during the rehabilitation and also complementary investigations and therapeutic changes were recorded.

**Results.**— During the study, 103 patients (p) received care in our unit following multiple trauma, prosthesis implantation (hip/knee/shoulder), lower limb amputation or burn injury. Thirty-seven new diagnoses was recorded in 21 p (20.4%), 18 males, 3 females, mean age 38 years. Twelve musculoskeletal injuries were retained. In 25 cases a neurological condition was diagnosed. For 8 patients, more than one second-look diagnosis was established. Symptoms were the main argument for the revision of the initial diagnoses in 86% of the cases, and X-ray revision for 14% others. Twenty-nine additional investigations were required. For all patients, orthopaedic and/or pharmacological treatments, as well as an adaptation of the rehabilitation protocol were necessary.

**Discussion.**— To our knowledge, there is no a data in the literature about “second-look” diagnoses in the post-acute care rehabilitation setting. The 20% prevalence observed in our study is high. The prevalence of the neurological conditions was that of musculoskeletal disorders. The vast majority of diagnoses (95%) were made in multiple trauma patients. The evolution of the health systems, characterized by a reduction of hospital stay duration, might contribute to extend this problem. It could also represent a new challenge for rehabilitation wards in terms of organization and relation with acute care units.

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### **Group workshops as part of guided self-rehabilitation contracts in spastic paresis: Our 2009–2012 experience**

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**Keywords:** Spastic paresis; Contract; Guided self-rehabilitation; Workshop; Group

**Introduction.**— Guided Self-rehabilitation Contracts (GSC) in paretic patients (after stroke, head or spinal cord injury, nervous system tumour, multiple