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S1

Translating motor control principles to practical applications in rehabilitation

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Archives of Physiotherapy 2019, **9(Suppl 1):**S1

Physiotherapists need to incorporate models of motor control and motor learning into their conceptual framework for clinical practice. Here, we consider how the nervous system organizes the action of a large number of body segments and joints in order to maintain reaching accuracy in motor tasks such as reaching from sitting or standing. Reaching can be accomplished by different combinations of joint movements permitting the system to adapt to unexpected situations, a process known as motor equivalence. Motor equivalence is defined as the set of combinations of different joint rotations (degrees of freedom) used to perform the same motor action. Following a stroke or damage to the central nervous system, deficits in motor planning and execution may ensue, leading to a reduced capacity to use the affected upper limb to meaningfully interact with objects in the environment. The capacity for adaptability depends on the residual ability of the nervous system to use different combinations of joint rotations to find solutions to motor problems. This capacity is limited in patients with hemiparesis due to decreases in the redundancy of the motor system, where redundancy is defined as a larger than needed number of movements available to the system. Reductions in redundancy may be related to deficits in threshold control and the specification of referent body postures.

Examples of how the stroke-damaged nervous system organizes reaching movements based on limited redundancy are presented while considering the extent to which compensatory motor patterns are adaptive. Key messages are that patients with chronic hemiparesis use excessive trunk movement even for reaches to close targets to assist hand transport during reaching [1,2] to assist in orienting the hand for grasping [3] and to assist arm swinging in standing and during walking [4]. In addition, for simple reaching tasks, when the trunk is involved, it is recruited (spatially and temporally) as an integral part of the reaching movement.

Compensatory trunk movement can also be adaptive. People with stroke use excessive trunk movement and arm-plane motion to compensate for limited shoulder flexion and elbow extension. Further investigation of adaptability is illustrated with results of studies of kinematic adaptability to sudden perturbation of the trunk when reaching from sitting [5] and when reaching from standing [6]. These studies show that people with even mild stroke have difficulty in rapidly changing elbow-shoulder interjoint coordination patterns to adapt reaching movements to sudden perturbation of trunk motion.

The ability to appropriately adapt interjoint coordination to changing task conditions is impaired in individuals with stroke, which may be explained by impairments in threshold control leading to deficits in the specification of referent body configurations for control of reaching.

Deficits in higher order motor control skills related to the use of motor compensations to adapt to unexpected situations, may restrict motor recovery. This capacity is not routinely identified in commonly used clinical scales. Recommendations for treatment approaches to increase redundancy and motor equivalence include the restriction of compensations during practice and encouraging the patient to explore the environment and find new solutions to motor problems.

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S2

The technologies as tools for controlling the patient-environment relationship

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Archives of Physiotherapy 2019, **9(Suppl 1):**S2

In rehabilitation the therapeutic relation between the patient and the therapist is largely out of control due to the huge amount of variables that run simultaneously during the training. In the last 30 years many technologies were introduced in the fields of the rehabilitation mainly represented by systems for motion analysis and by robotic devices. Motion analysis systems allowed the gathering of a large extent of synchronized variables permitting the multifactorial analysis of the movement [1]. The analysis of the movement offered the

how the physiotherapist can carry forward his training and prevention activity concerning this problem at school age.

S20

To write a scientific article: the meaning of the checklists

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Scientific research articles provide a method for scientists to communicate with other scientists about the results of their research but without a complete description of the intervention other researchers cannot replicate or build on research findings or it is not clear to decision makers how to reliable implement the intervention (1).
In order to deal meaning and development of the checklists regarding the well writing of a scientific article, the reporting of the experimental studies has been considered in this presentation.
In 1980s, the IMRAD style was defined as modality of scientific reporting. Articles were divided in Introduction, Methods, Results and Discussion (2). Introduction is dedicated to provide the context of the study and to define its objective, Methods are addressed to provide details to allow researchers to do the same experiment, Results have to synthetically show the results arising from methods, and Discussion have to discuss the results inside the context introduced at the beginning of the article. Reporting a scientific article should retrace the questions which have led the researcher to promote the study: why (Introduction), how (Methods), what (Results) and so what (Discussion).
In 1996 the IMRAD structure was implemented with the first edition of the CONSORT checklist. This edition had subheadings and descriptors able to detail how trial was performed. The need to implement the IMRAD structure is understandable from the words of prof Altman: " the CONSORT statement means that authors will no longer be able to hide inadequacies in their study by omitting important information..." (3).
In 2010 Hopewell (4) published an interesting comparative study about the differences in reporting methodological items in journals indexed on PubMed in the years 2000 and 2006. The trend showed a significant increase in following the CONSORT checklist, although: the situation remained sub-optimal; did not involve all items as, for example, the blinding; did not involve all scientific journals. Similar results were reported in 2012 in a systematic review with meta-analysis published on the Cochrane Database of Systematic Review (5).
In those years some authors began to warn about the inappropriateness of the CONSORT checklist for the non-pharmacological trials. In 2007 Boutron (6) highlighted that the CONSORT checklist was not entirely applicable to non-pharmacologic trials as it forecast interventions involving several components; items as blinding are more difficult to achieve; experimental designs relies on more complex methods. Few time later, always Boutron published the extension of the CONSORT checklist for trials assessing non-pharmacologic treatment (7). This checklist stressed some aspects linked to the role and the intervention modalities of people involved in the studies.
Nevertheless, the CONSORT checklist for non-pharmacologic trials is not sufficient for the reporting of physiotherapy studies. Physiotherapy intervention are multimodal; involve the use of manual techniques, consumable materials, equipment, education, training and feedback. Moreover, the dose or intensity of treatment may be progressed over time (8).
From these considerations, in 2014 has been proposed, as further development of the CONSORT checklist, the Template for Intervention Description and Replication checklist and guide (TIDieR) (9). Its main characteristic is that all the details inherent every possible sources of variability in determining the results of the study have to be described. For example, it is no longer acceptable to report the intervention administered to control group as "usual care".
It is even more clear that to correctly report an experimental study is not only a favor to other researchers but also a modality to improve own methodological skills.

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S21

Single-Subject Design: Experimental Designs for Research and for Clinical Practice

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Background: The individual variability among people presenting motor impairments often leads to the difficulty to obtain an adequate sample size in the conduction of trials in physiotherapy. Furthermore, in clinical practice, it is often difficult to recognize the relationship between the administration of a treatment and its expected results. Psychological and educational sciences often use single-subject design (SSD) studies to explore behaviours under experimental conditions. This study design allows to test the relationship between an independent variable, the treatment, and a dependent variable, the main outcome of interest. The purpose of this work is to present researchers and clinicians the methodology of the SSD studies and their application in physiotherapy both in research context and everyday practice [1].
Results: In SSD studies, repeated measurements of the outcome of interest occur across time starting from a condition without treatment, the so called "A-phase", and continuing during the administration of the treatment, the so called "B-phase". A-phase measurements serve as a standard of performance that can be compared to B-phase measurements in terms of change in the mean level, change in trend or change in variability of measure, depending on the nature of the assessed outcome. Different types of SSD studies exist, those alternating introduction and removal of the treatment called "treatment removal", following the AB, ABA or ABAB schemes,

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Domain: Variable	Importance Score	Rank
Autonomic		
HRV: total power (color-word Stroop)	19.1	15
Average mean arterial pressure (pain-affect Stroop)	16.2	17
Average mean arterial pressure (color-word Stroop)	15.8	19
Average heart rate-ECG (pain-affect Stroop)	12.6	22
HRV: total power (pain-affect Stroop)	10.8	28
Clinical		
Count of nonspecific orofacial symptoms	92.9	2
Oral parafunction sum Score (OBC)	66.0	5
Could not open mouth wide in last month	54.1	6
No. of palpation sites with pain (right masseter)	50.0	8
Ever had orthodontic procedures	29.3	12
Demographic		
Age	51.6	7
Marital status	44.7	9
Race	25.1	13
Lifetime US residence	12.4	23
Satisfaction with financial situation	5.5	58
Health status		
Count of 20 comorbid conditions	100.0	1
Bodily pain (SF-12v2)	80.6	4
General Health (SF-12v2)	31.8	11
No. of different types of headaches in the last year	16.1	18
Sleep latency (PSQI)	12.7	21
Pain sensitivity		
Pressure Pain threshold (masseter)	5.8	53
Heat pain ratings of 10 stimuli: area under curve (48°)	4.2	62
Pressure pain threshold (trapezius)	3.7	66
Thermal pain single stimulus rating (46°)	3.6	67
Thermal pain single stimulus rating (48°)	3.5	68
Psychosocial		
Somatic symptom reporting (PILL)	42.4	10
Catastrophizing-magnification (PCS)	10.4	30
EPQ Lie scale	9.9	31
Anxiety (SCL-90-R)	9.7	32
Mood-clearheaded/confused (POMS-Bi)	6.5	46

Fig. 1 (abstract P26). Risk factors for developing TMDs

P27

Psycho-social process underlying motivations to participate in a research study: a grounded theory study in patients with non-small cell lung cancer

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Background and Objective: Non-small cell lung cancer (NSCLC) represents 85% of lung cancers, and no standardized and well-studied rehabilitation approaches are available [1]. The willingness to participate in an experimental study and treatment compliance are critical issues that emerged in the conduct of clinical research, also in the rehabilitation field [2]. Aim of this study was to analyze the psychosocial process that occurs when it is proposed to patients with NSCLC to participate in a rehabilitation research project, and what brings them to join that.
Materials and methods: This was a Grounded Theory qualitative study, part of a larger project (PuReAIR) aimed to analyze the effectiveness of a rehabilitative intervention in patients with NSCLC that is currently in place in the AUSL-IRCCS of Reggio Emilia. Subjects were recruited among those participating in the PuReAIR project, and subsequent snowball sampling was adopted. A semi-structured interview was used to investigate patients experience. Data were encoded by constructing of conceptual categories to build a theory.
Results: A total of 9 subjects were included in this study. The analysis of the data revealed that the investigated process is based on two main categories: i) trust in science and ii) in the subject that proposes the study, reinforced by a strong perception of the established therapeutic relationship with the operators -in the foreground the Physiotherapists- and fed by the positive feedback.
Conclusions: The proposal to participate in an experimental rehabilitative treatment, advanced immediately after the diagnosis of cancer, was welcomed by the patients. Being able to take advantage of a new therapy opportunity, that does not involve risks and that is perceived as help for oneself and others, are important elements for the patient, who can help in the decision to adhere to the experimentation.

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P28

Factors associated with citation rate of systematic reviews in physiotherapy

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Background and Objective: The use of citation rate as a measure of quality of a stydy is a very criticized method, but it is the most used to assess the performance of researchers, articles and journals [1]. It is also believed that, in order to measure the impact of an article, the number of quotes it receives should be associated with its methodological qualities and the relevance of the subject being discussed [2]. The purpose of this study is to detect which factors are associated with the citation rate of systematic reviews published in physiotherapy.
Materials and Methods: Articles indexed on the PEDro and Scopus databases in 2010 were selected. The following independent variables were recorded: language of publication, indexing in PubMed database, type of access to articles (open access, delayed open access or restricted access), sub-discipline, 5 years Impact factor of journals where the articles were published, number of authors, country where the study was conducted and to be a Cochrane review. The citation rate until December 2015 was considered as dependent variable. Data were analysed using a stepwise multiple regression model.
Results: A total of 436 articles were extracted, 68 were excluded, and 368 articles were analyzed on the PEDro database as well as on Scopus. From the data analysis it was noted that the factor most associated with the number of citations was the IF on 5 years ($\beta = 0.314$) explained 5.6% of variance (adj $R2 = 0.056$), followed by a Cochrane review ($\beta = -0.246$) explaining additional 5.1% of variance (adj R2 =

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P36

Programme of perioperative pulmonary rehabilitation in surgically treated lung cancer patients: preliminary data

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Background and Objective: Non-small Cell Lung Cancer (NSCLC) comprises 85% of all lung cancers. Lung resection is the election treatment but surgery might have a significant impact on Quality of Life (QoL) and physical condition. Pulmonary rehabilitation (PR), both before and after surgery, including aerobic and strength exercises, could reduce symptoms and morbidity and improve exercise capacity, pulmonary function and QoL.

Aim: investigate the efficacy of intensive PR on exercise capacity for NSCLC patients surgically treated.

Materials and Methods: Open-label randomized controlled trial. Participants: suspected or diagnosed NSCLC (staging I-II), waiting for surgery, not candidates for neo-adjuvant or adjuvant therapy.

Control group (CG): one therapeutic educational session the day before surgery and early standard inpatient PR after surgery.

Intervention group (IG): early standard inpatient PR after surgery plus 14 preoperative PR sessions (6 outpatient and 8 home-based) and 39 postoperative PR sessions (15 outpatient e 24 home-based). This experimental treatment is based on aerobic, resistance and respiratory training both pre and post-operative. Detailed experimental programme is reported in figure 1.

Patients are assessed at enrollment (T0), the day before surgery (T1), one month after surgery (T2) and six month after surgery (T3) for exercise capacity, respiratory functions, pain, mood disturbances and quality of life (Table 1).

Primary outcome: Six Minutes Walk Test (6MWT)

Results: We present data regarding the first 86 patients enrolled (42 IG; 44 CG). Preliminary analysis of the primary outcome (6MWT) in IG shows an average improvement of 56m 6 months after surgery and the difference from T0 to T3 is statistical significant (p=0,002). This difference in CG is not significant (p=0,809).

The compliance is high: 71% in the preoperative phase and 86% in the postoperative phase.

No adverse effects were registered.

Conclusion: Preliminary data seems to highlight the efficacy of perioperative PR improving exercise capacity. The experimental intensive PR programme implemented registered high level of adherence and no side effects treatment related.

Table 1 (abstract P36). Compliance at experimental programme, both pre -and postoperative

	T0 Baseline		T1 1 day before surgery		T2 1 month		T3 6 months	
			IG	CG	IG	CG	IG	CG
Pulmonary function (PFTs)	x	Randomization	x				x	x
Exercise capacity (6MWT)	x				x	x	x	x
Quality of life (SF-12)	x						x	x
Mood disturbances (HADS)	x		x	x			x	x
Pain (NRS)	x				x	x	x	x
Length of stay					x	x		
Postoperative complications					x	x	x	x

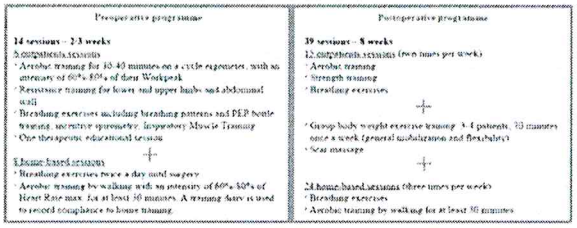

Fig. 1 (abstract P36). Preoperative and postoperative programme

P37

Respiratory management of people with sci (spinal cord injury) from hospital to discharge: flow-chart proposal fron an Italian spinal unit

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Background and Objective: Respiratory function is compromised by Spinal Cord Injury (SCI) and the more severe the deficiency is the higher the AIS level is [1]. Respiratory deficiency is caused by muscle paralysis and by reduced capacity in clearing respiratory secretion. Even now infection pneumonia is one the main cause of mortality in SCI [1]. In people with SCI, rehabilitative treatment has to set two main goals: keep the lungs and throat clear of mucus and improves respiratory muscle strength and endurance. Cough assistance (CA) is one of the most important treatment in respiratory rehabilitation [2-4].

There are other respiratory management techniques which are associated to CA.

Aim: in order to even out the management of rehabilitation process in our Spinal Unit, we made a flow-chart about respiratory treatment in people with SCI.

Materials and Methods: This flow chart describes our experience about respiratory management from acute phase to discharge, in respect with the scientific evidence. The aim is for people affected by SCI , in spontaneous breathing, to reach as much autonomy as possible. This is a procedure that should be followed "step by step".

Results: The use of this flow-chart in the SU Montecatone has the aim not only to define a uniform rehabilitation process, but also to be a model for the training process of the respiratory therapist. It will be necessary more studies to validate this kind of process. We believe that for the application of rehabilitative program is fundamental a perfect integration between the team's professional and the correct use of medical exams.

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Table 1 (abstract P44). Summarize of the Short Sensory Profile data in our sample (N = 46)

	Minimum	Maximum	Mean	SD
Total Short Sensory Profile Score	119	176	147.68	15.047
Tactile Sensitivity	11.00	35.00	29.0435	4.82105
Taste/Smess Sensitivity	4.00	20.00	17.5652	4.23558
Movement Sensitivity	7.00	15.00	13.1739	2.56735
Underresponsive/Seeks Sensations	9.00	34.00	21.3913	6.75106
Auditory Filtering	11.00	27.00	19.6957	3.97699
Low Energy/Weak	12.00	30.00	25.0652	5.42178
Visual/Auditory Sensitivity	16.00	25.00	21.6522	2.89227

P45

Return to work of cancer survivors in Europe: systematic review of the literature

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Background and Objective: Cancer incidence and survival are growing. Over 1/3 of cancer survivors (CSs) are in their working-age [1]. CSs experience pain, fatigue, cognitive dysfunction, mood disorders that may adversely affect social functioning [2].

Systematic reviews show 64% employment rate for CSs, with high variability in different contexts (range 24% -94%) [3]. We reviewed the recent literature on the employment rate of CS in Europe, investigating the factors influencing the return to work (RTW).

Materials and Methods: Bibliographic research was conducted in MEDLINE, CINAHL, EMBASE, PsycINFO, COCHRANE library from January 2010 to April 2017. Three independent researchers analyzed and critically evaluated each citation through the CASP [4]. We included european cancer population studies with remote follow-up. Table 1 shows the data extracted from each study. This study was supported by Chamber of Commerce, GRADE Onlus and Hospital IRCCS-ASMN of Reggio Emilia (Italy).

Results: Through the selection process we included 10 studies on 914 citations.

Investigated cohorts were diagnosed from 1995 to 2009, follow-up had an average duration of 2 years (range 0.2-23.4 years). The included samples range from 382 to 5074 working-age individuals. The most represented cancer locations were: breast (6038), genital and prostate (4021), gastrointestinal (1546), hematologic (1182), upper aero-digestive tract/lung (n.944), urogenital non-prostate (n. 933) (n. 311), head and neck (n. 23) and unspecified sites (n. 1250).

The rate of RTW fluctuate from 55.9% to 77%. Among the employed at the time of diagnosis RTW fluctuate from 60 to 84%. Factors associated with RTW are shown in Figure 1.

The results reflect the situation in Northern Europe. Southern Europe is completely not represented and Central Europe is scarcely represented.

Conclusion: There is urgent need of precise and up-to-date data collected in South and Central Europe, to allow for understanding if RTW is problematic in CSs and whether it requires socio-rehabilitative interventions to contain its potential impact on individuals and society.

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Table 1 (abstract P45). Data extracted for each study included in the review

Country
Study objective
Study design
Main outcome measure
Data collection strategy
Data collection period
Response rate
Time since diagnosis
Follow-up duration
Inclusion criteria for target population
Sample size
Return to work rate
Factors associated to RTW
Sick leave