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Rehabilitation and respiratory management in the acute and early post-acute phase. "Instant paper from the field" on rehabilitation answers to the Covid-19 emergency

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Abstract

Covid-19 is a respiratory infectious disease that can cause respiratory, physical and psychological long-term dysfunctions in patients. First recommendations on respiratory management were published, but they were not based on the specific needs due to Covid-19. In this paper we share the early experiences from the clinical field in Northern Italy, where the epidemic started in February. This paper summarizes the second webinar on Covid-19 (230 live attendees, 11,600 viewers of the recorded version) organized by the Italian Society of Physical and Rehabilitation Medicine about rehabilitation and in particular respiratory management in the acute (Intensive Care Unit – ICU) and immediate post-acute phases.
There is the need to prepare for the post-acute phase. ICU length of stay is relatively long, with immobilisation in prone position. Some specific problems are described, including severe muscle weakness and fatigue, joint stiffness, dysphagia, (neuro)psychological problems, impaired functioning concerning mobility, activities of daily life and work. A lot is yet unknown and patients can experience long-term consequences as we know from the literature on the post-intensive care syndrome, but Covid-19 has unique features to be investigated and understood. As one colleague stated during the Covinar: this is a marathon, not a sprint….

Introduction

The Covid-19 pandemic is currently spreading rapidly throughout Europe and other parts of the world, putting huge pressure on the health systems. Covid-19 is a respiratory infectious disease that can cause long-term respiratory, physical and psychological dysfunctions in patients (1). Recently some papers presenting first recommendations on respiratory rehabilitation management were published (2-4), but they are not specific, since we are still missing data about the current specific needs due to Covid-19.
Since February 2020, Northern Italy was hit hard and fast, as the first region in Europe. Sharing first experiences and practices within the medical and rehabilitation community is crucial (5,6). Therefore, the Italian Society of Physical and Rehabilitation Medicine (SIMFER) has been organizing webinars, so-called

"Covinars", during which Physical and Rehabilitation Medicine (PRM) physicians share instant information from the field (7). The first was held March 18th, reporting the first impact of the epidemic on rehabilitation services (8).
This paper summarizes the content of the second Covinar, held on March 26th, 2020. Covinar 2 dealt with rehabilitation, and in particular respiratory management of the Covid-19 infection either in the acute (in Intensive Care Units – ICU or other wards) or immediate post-acute phase (Physical and Rehabilitation Medicine wards). In this paper we want to share these early experiences in Northern Italy coming from the clinical field.

The Covinar

Four PRM physicians and three pneumologists from four Italian regions were interviewed during a 90-minute webinar (Table 1). Table 2 shows the situation of the pandemic in the respective regions on that day (Figure 1). One author (PB) prepared and sent in advance to the participants a series of questions and acted as an interviewer, asking also questions received live during the Covinar. Similarly to the first Covinar, out of 5,000 PRM physicians in Italy, and 3,300 SIMFER members, 230 attended the Covinar live (4.5% and 7%, respectively). Up to April 5th, 11,600 more participants, including other specialists and health professionals, watched the recorded version, with a growth of 30% from the first Covinar (8,900 participants).

Impact on rehabilitation services

Some measures described in Covinar 1 (8) were confirmed in Covinar 2 (https://www.youtube.com/watch?v=IHSw-7ye4nA): visitors were banned; many patients were discharged early to make place for patients transferred from hospitals who admitted Covid-19 patients; most hospitals created separate wards for Covid-19 patients with dedicated teams to include also patients who became positive after admission, but rapidly some patients in the non-Covid-19 units became positive as well; rehabilitation activities and admissions of "classical" patients were stopped or reduced.

There was some new information from what previously reported (8). Therapists supported nurses in other tasks such as basic nursing care, or "proning" in ICU. Staffing issues, due to the need for quarantine of health professionals, and lack of personal protective equipment required restricting contacts between personnel and Covid-19 patients. One solution was changing to longer shifts. Another solution consisted of using video-consulting, allowing physicians to do part of the work outside the Covid-19 ward, being video-connected to the nurse in the ward. The availability of web based electronic patient records facilitated working in a Covid-19 ward and is much more hygienic than "physical" paper records. One colleague mentioned the role of residents as very valuable and stressed the important lessons they are learning during this emergency situation.

Acute and early post-acute clinical issues

Patients with Covid-19 disease are at risk to develop respiratory distress (or acute respiratory distress syndrome) and hypoxia can lead to multiple organ failure (9). Patients start acute rehabilitation in phase of decurarization. Depending on the severity of illness patients may need oxygen therapy, non-invasive ventilation (NIV) including CPAP and in the absence of a rapid positive response even intubation and admission to ICU. The most significant clinical parameters seem to be body temperature, respiratory rate and oxygen saturation. It has been noted that the length of stay in ICU is longer than usual, with an average of three weeks. The weaning phase and transfer to a rehabilitation service need to be gradual, with accurate monitoring as the patients remain instable several days after extubation. A scheme of 3 weeks ICU, followed by 3 weeks acute medical ward and 3 weeks inpatient rehabilitation is being considered in one centre. Patients staying in ICU show several complications, some due to the long period of immobilisation and many hours in prone position, as it is advised in case of Covid-19 pneumonia. Early rehabilitation seems not well tolerated, with rapid desaturation.

The following issues have been diagnosed up to now: dysphagia, muscle weakness, critical illness myopathy and neuropathy, reduced joint mobility, neck and shoulder pain (due to prolonged proning), difficulty in verticalization, impaired balance and gait, limitations in activities of daily living (ADL), difficult awakening with long-lasting confusional state and psychological problems. Due to lung fibrosis as a sequel of pneumonia some patients show severe respiratory insufficiency necessitating respiratory rehabilitation or even NIV. Other patients produce tough secretions requiring specific physiotherapy techniques or technical removal. Even young adults may show impaired respiratory function after the acute phase. Patients with premorbid neurological conditions seem to deteriorate during the Covid-19 infection. All these impairments have to be considered and faced during the post-acute phase, while it is not yet possible to know how many of these will remain also in a late post-acute and chronic phase. Moreover, frequency and relative importance of the consequences, priorities and specificity of interventions for each impairment have still to be determined.

Communication issues

The banning of visitors, and reduction of rehabilitation interventions, mean that patients are very isolated. Regular communication by phone or videoconference between patient and family, as well as physician and family are required. Also discharged patients need to be contacted not to make them feel abandoned. Similarly, to what was reported in Covid 1, the richness of patient contacts in rehabilitation is missed (8). Heart-breaking scenes have been reported when patients died, torn apart from their families and having to break the bad news to families by phone, seeing bags with clothes to be picked up later by the relatives. In general, there is a very high psychological burden on health professionals that could lead to later sequalae.

Conclusion

In the North of Italy, where the Covid-19 epidemic started in February, the first experiences in the field of rehabilitation show clearly the need to prepare for the post-acute phase for patients who experienced a severe degree of the disease. Length of stay in ICU seems to be relatively long with immobilisation in bed and many hours spent in a prone position. Some specific problems are already described here, such as severe muscle weakness and fatigue, joint stiffness, dysphagia, (neuro)psychological problems, impaired functioning concerning mobility, ADL and work. A lot is yet unknown and every day choices need to be made between what we consider the right thing to do and the possible in a concrete situation. Also, this pandemic lasts more than some weeks and patients will experience consequences during moths or even longer, as we know from the literature on the post-intensive care syndrome (10, 11), and as one colleague stated during the Covinar: this is a marathon, not a sprint….

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Table 1. Services and settings of the participants to the Covinar (SIMFER "Covid-19" webinars). SABI: Severe Acquired Brain injury SCI: Spinal Cord Injury; MSK: Musculoskeletal; Neuro: Neurological; Pneu: Pneumological; Cardio: Cardiological

	Rehabilitation activities															**Setting**		
	Acute (wards other than rehabilitation)									**Post-acute (rehabilitation ward/hospital)**								
	Consultations/day					**Treatments/day**				**Beds**					**Hospital**	**Location**		
	*Usual**	*Current°*				*Usual**	*Current°*			*Usual**	*Current°*							
		Total		*Covid-19§*			*Total*		*Covid-19§*		*Total*		*Covid-19§*					
		N	*%*	*N*	*%*		*N*	*%*	*N*	*%*		*N*	*%*	*N*	*%*		*Town*	*Region*
AA	8	6	75 %	5	83 %	50	4	8%	4	100 %	14	0		0		General	Milan	Lombardy
RA	5	4	80 %	4	100 %	5	4	80 %	4	100 %	79	44	56 %	7	16 %	Research	Negrar (VE)	Veneto
FG, AP	12	8	67 %	4	50 %	38	22	58 %	14	64 %	20	20	100 %	2	10 %	University	Orbassano (TO)	Piedmont
MG, FM	10	2	20 %	2	100 %	50	30	60 %	20	67 %	89	65	73 %	20	31 %	Rehabilitation	Costamasnaga (LC)	Lombardy
FL, ML	3	3	100 %	0		5	5	100 %	0		14	14	100 %	6	43 %	Research	Correggio (RE)	Emilia Romagna

* Usual: before the Covid-19 emergency, when numbers could have been reduced to reduce risks of contagion

° Current: at the moment of the Covinar ()

§ Covid-19: Activities performed for Covid-19 patients

Table 2. Reported cases of sars Cov-2 at March, 26th, in Italy and in the Regions of the participants (in parentheses the total cases in the areas where the participants operate)

AREA	TOTAL CASES	HOSPITALIZED	ADMITTED IN ICU
ITALY	80.539	24.753	3612
LOMBARDIA	34.889 (Como 762)	10.681	1263
PIEMONTE	6534 (Torino 3108)	2633	408
VENETO	6935 (Verona 1402)	1447	326
EMILIA ROMAGNA	10.816 (Reggio Emilia 1698)	3354	301

Figure 1. Evolution of the Covid-19 epidemic according to the official Italian Health Ministry data, and timelines of the most important restrictions imposed to the population, Italian Society of Physical and Rehabilitation Medicine (SIMFER) initiatives and publications in the European Journal of Physical and Rehabilitation Medicine (EJPRM). Covinar = SIMFER "Covid-19" webinars. Italian government reactions to epidemic: (1) February 24th, 2020: red zones (total quarantine) close to Milan; (2) March2nd: closure of schools; (3) March 8th: travel restrictions; (4) March 11th: total shutdown