

One year of COVID-19 pandemics and its effect on rehabilitation: the search for the best available evidence

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It is one year since the pandemic started, and it is interesting to see some first data from the scientific literature on COVID-19 consequences under a rehabilitation perspective. In this editorial, we present some historical facts related to the European Journal of Physical and Rehabilitation Medicine (EJPRM) and discuss which kind and level of evidence have been produced this year in the field.

When the SARS-CoV2 virus hit Italy, first among western countries, many Italian scientists felt the burden to provide a proper answer for Italy and the rest of the world that was looking to our country. Some of us stated "it is only flu", others considered the problem as a "China and Far Eastern countries" matter only, remembering past experiences with other virus epidemic. These statements backfired us during the International Society of PRM (ISPRM) in Orlando beginning of March 2020 (the last international PRM Meeting at the dawn of the pandemic) when we had to explain to many colleagues from other world countries that "it was NOT only flu".

In this context, after the initial shock, the Italian PRM Society (SIMFER) responded very fast with the first international guideline on the topic,<sup>1</sup> published in the EJPRM. This paper gave the start to a fast approach to all papers on the COVID-19 pandemic by the journal. As all the readers know, EJPRM is a clinical journal, and we aim at providing valuable answers for everyday professional life to all PRM physicians and professionals in Europe, the Mediterranean area and the rest of the world. This approach means that we look not only at the best evidence per se (as testified by the long-standing collaboration with Cochrane Rehabilitation).<sup>2,3</sup> We look at the best *available* evidence, that is, the evidence available "hic et nunc" (here and now), even if it is not the theoretical top of evidence expected in standard times. The top evidence (RCTs, systematic reviews) cannot come immediately in front of the previously unknown. The top evidence arrives even later in rehabilitation since research is challenging in the field.<sup>4,5</sup> Moreover, the need for wards for COVID-19 acute patients stopped most of the rehabilitation services during the worst periods of the pandemic.<sup>6</sup>

For all these reasons, the EJPRM started a fast (and accurate) review process for all COVID-19 related papers. As a result, the third issue of the journal in 2020 (published in June) was already monographic on COVID-19.<sup>1,6-22</sup> Like all the other journals at that moment, in this special issue, we included the only possible stage of evidence, the lowest, i.e. expert opinions. Nevertheless, we chose a specific expert opinion, with the "Instant papers from the field":<sup>8-11</sup> not the usual experts who had not seen one single COVID-19 patient, but colleagues who were facing COVID-19 in the front-line every day. "Instant papers from the field" have been a methodological innovation that can find future application in case of other rapidly evolving diseases. SIMFER selected them for its "Covinars" (webinars on COVID-19 impact on rehabilitation) to help colleagues in the country understand how to react to the surge of the pandemic. We rapidly overcome this lowest level of evidence: we published all the "Instant papers from the field" between April and May 2020. In spite of the low quality of evidence conveyed by these papers, they are among the most cited of the EJPRM,

testifying the relevance of giving rapid references to rehabilitation professionals and researchers to help them cope with a completely unknown clinical scenario (Table 1).

Table 1. Twenty Scopus most cited 2020 papers of the European Journal of Physical and Rehabilitation Medicine at the search date (March 19, 2021). COVID-19 related papers occupy the first 11 positions, and only 5 out of 20 are on other topics.

Rank	Citations	Authors	Title	Reference
1	45	Boldrini, P., Bernetti, A., Fiore, P., Bargellesi, S., Bonaiuti, D., Brianti, R., Calvaruso, S., Checchia, G.A., Costa, M., Galeri, S., Lombardi, B., Zambuto, A., Capodaglio, P., Ceravolo, M.G., Ferriero, G., Foti, C., Franchignoni, F., Gimigliano, F., Giustini, A., Kiekens, C., Negrini, S., Pestelli, G., Zampolini, M., SIMFER Executive Committee, SIMFER Committee For International Affairs	Impact of COVID-19 outbreak on rehabilitation services and Physical and Rehabilitation Medicine physicians' activities in Italy An official document of the Italian PRM Society (SIMFER)	56 (3), pp. 315-318.
2	37	Kiekens, C., Boldrini, P., Andreoli, A., Avesani, R., Gamna, F., Grandi, M., Lombardi, F., Lusuardi, M., Molteni, F., Perboni, A., Negrini, S.	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	56 (3), pp. 323-326.
3	26	Negrini, S., Ferriero, G., Kiekens, C., Boldrini, P.	Facing in real time the challenges of the covid-19 epidemic for rehabilitation	56 (3), pp. 313-315.
4	25	Ceravolo, M.G., De Sire, A., Andrenelli, E., Negrini, F., Negrini, S.	Systematic rapid "living" review on rehabilitation needs due to covid-19: update to March 31, 2020	56 (3), pp. 347-353.
5	22	Negrini, S., Kiekens, C., Bernetti, A., Capecci, M., Ceravolo, M.G., Lavezzi, S., Zampolini, M., Boldrini, P.	Telemedicine from research to practice during the pandemic "instant paper from the field" on rehabilitation answers to the covid-19 emergency	56 (3), pp. 327-330.
6	21	De Sire, A., Andrenelli, E., Negrini, F., Negrini, S., Ceravolo, M.G.	Systematic rapid living review on rehabilitation needs due to COVID-19: Update as of April 30, 2020	56 (3), pp. 354-360.
7	19	Negrini, S., Grabljevec, K., Boldrini, P., Kiekens, C., Moslavac, S., Zampolini, M., Christodoulou, N.	Up to 2.2 million people experiencing disability suffer collateral damage each day of covid-19 lockdown in Europe	56 (3), pp. 361-365.
7	19	Boldrini, P., Kiekens, C., Bargellesi, S., Brianti, R., Galeri, S., Lucca, L., Montis, A., Posteraro, F., Scarponi, F., Straudi, S., Negrini, S.	First impact of covid-19 on services and their preparation "instant paper from the field" on rehabilitation answers to the covid-19 emergency	56 (3), pp. 319-322.
9	17	Li, J.	Rehabilitation management of patients with covid-19: lessons learned from the first experience in china	56 (3), pp. 335-338.
10	16	Curci, C., Pisano, F., Bonacci, E., Camozzi, D.M., Ceravolo, C., Bergonzi, R., De Franceschi, S., Moro, P., Guarnieri, R., Ferrillo, M., Negrini, F., De Sire, A.	Early rehabilitation in post-acute covid-19 patients: data from an Italian covid-19 rehabilitation unit and proposal of a treatment protocol	56 (5), pp. 633-641.
11	14	Ceravolo, M.G., Arienti, C., De Sire, A., Andrenelli, E., Negrini, F., Lazzarini, S.G., Patrini, M., Negrini, S.	Rehabilitation and covid-19: the Cochrane rehabilitation 2020 rapid living systematic review	56 (5), pp. 642-651.
12	11	Liao, Y.-Y., Tseng, H.-Y., Lin, Y.-J., Wang, C.-J., Hsu, W.-C.	Using virtual reality-based training to improve cognitive function, instrumental activities of daily living and neural efficiency in older adults with mild cognitive impairment	56 (1), pp. 47-57.
13	8	Carda, S., Invernizzi, M., Bavikatte, G., Bensmail, D., Bianchi, F., Deltombe, T., Draulans, N., Esquenazi, A., Francisco, G.E., Gross, R., Jacinto, L.J., Pérez, S.M., O'dell, M.W., Reebye, R., Verduzco-Gutierrez, M., Wissel, J., Molteni, F.	Covid-19 pandemic. What should physical and rehabilitation medicine specialists do? A clinician's perspective	56 (4), pp. 515-524.
13	8	Van Geel, F., Moumdjian, L., Lamers, U., Bielen, H., Feys, P.	Measuring walking-related performance fatigability in clinical practice: A systematic review	56 (1), pp. 88-103.
15	7	Boldrini, P., Garcea, M., Brichetto, G., Reale, N., Tonolo, S., Falabella, V., Fedeli, F., Cnops, A.A., Kiekens, C.	Living with a disability during the pandemic "instant paper from the field" on rehabilitation answers to the covid-19 emergency	56 (3), pp. 331-334.
15	7	Chaler, J., Gil Fraguas, L., Gómez García, A., Laxe, S., Luna Cabrera, F., Llavona, R., Miangollarrapage, J.C., Del Pino	Impact of coronavirus disease 2019 outbreak on rehabilitation services and	56 (3), pp. 369-371.

		Algarrada, R., Salaverría Izaguirre, N., Sánchez Tarifa, P., Santandreu, M.E., Garreta Figuera, R.	physical rehabilitation medicine and rehabilitation physicians' activities: perspectives from the Spanish experience	
17	6	Balestroni, G., Panzeri, A., Omarini, P., Cerutti, P., Sacco, D., Giordano, A., Pistono, M., Komici, K., Rossi Ferrario, S.	Psychophysical health of elderly inpatients in cardiac rehabilitation: a retrospective cohort study	56 (2), pp. 197-205.
18	5	Trabacca, A., Russo, L.	Covid-19 and child disabilities: whom to protect and how	56 (3), pp. 372-373.
18	5	Mangone, M., Paoloni, M., Procopio, S., Venditto, T., Zucchi, B., Santilli, V., Paolucci, T., Agostini, F., Bernetti, A.	Sagittal spinal alignment in patients with ankylosing spondylitis by rasterstereographic back shape analysis: an observational retrospective study	56 (2), pp. 191-196.
18	5	Paolucci, T., Cardarola, A., Colonnelli, P., Ferracuti, G., Gonnella, R., Murgia, M., Santilli, V., Paoloni, M., Bernetti, A., Agostini, F., Mangone, M.	Give me a kiss!: an integrative rehabilitative training program with motor imagery and mirror therapy for recovery of facial palsy	56 (1), pp. 58-67.

In April 2020, we also consolidated the existing strong collaboration with Cochrane Rehabilitation to focus on COVID-19. We started together with the rapid living systematic review on the topic.<sup>15,16,23-29</sup> In this way, the EJPRM showed again to be at the forefront of methodology: before 2020 existed only either rapid or living systematic reviews, but not a rapid living one. Since then, there have been some, with ours being the first published in the literature. This evolution will probably remain in the future since it refers to the top level of evidence: systematic reviews.

Taking a more general look at the overall PRM journals panorama, the considerable importance of COVID-19 papers is confirmed for all of them. Nine papers in the first 20 positions have been published in the EJPRM (Table 2). Figure 1 highlights the differences among journals, based on the percentages of papers on COVID-19 they published. The more clinically oriented is the journal, hence more interested into circulating rapid evidence about this new challenge, even if theoretically of "low quality" (but the best available at the moment), the greater the number of papers on the topic it published; conversely, the more research-oriented is the journal, with the idea that only "high quality" studies should be published, the less COVID-19 papers it published. In our EJPRM interpretation, though, this is a distortion of the system. We disagree with the spread pre-concept that the "scientific" approach means publishing only the papers most methodologically sound in absolute terms, and not relative to the specific topic considered. In this strict "methodologically pure" perspective, a Randomised Controlled Trial or a Systematic Review will always have the prevalence on any other type of paper. In our "clinical" perspective, case reports are worth publication if they represent the highest possible level of evidence in a specific area of rehabilitation research.

Consequently, when the pandemic exploded, it was sound to publish expert opinions, even if for a short time and – as previously explained – with a specific perspective of who is "expert": for us, in COVID-19, experts were colleagues facing the new disease in the field, and not the usual "opinion leaders". For the EJPRM, this is not only a good "clinical" approach, but also a reliable, and useful, "evidence-based" perspective.

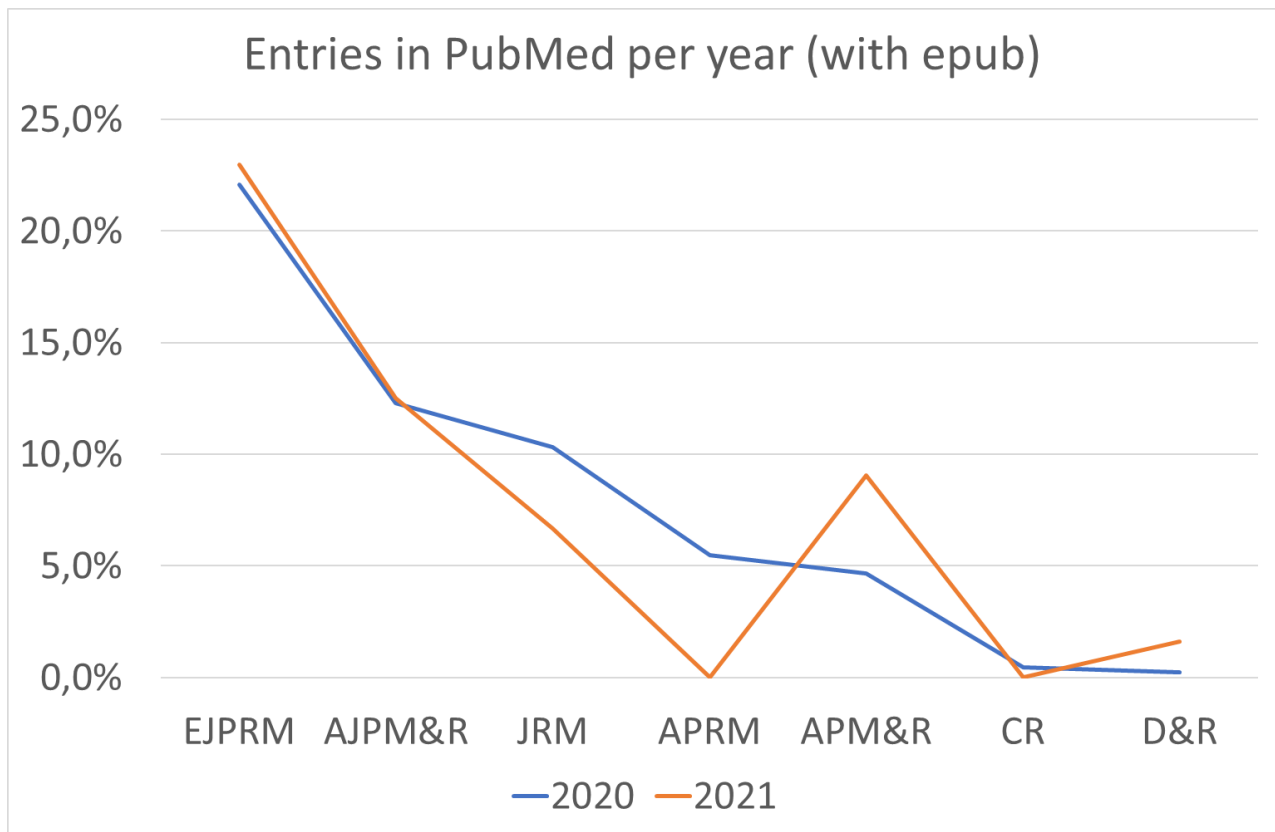
The rapid living systematic reviews (RLSR) published in the frame of the largest REHCOVER action represent an excellent demonstration of a "clinically-guided" evidence reporting approach. In fact, the authors of the RLSR updated the search methodology and paper selection criteria as far as the number of observations and the length of patients' follow-up increased. Hence, while the first RLSR edition just conveyed expert opinions on how to manage the limitations of functioning of rehabilitation interest, the second edition provided a very large number of case reports and case series on the prevalence of COVID-19 impact on different body functions, other than the respiratory one, and their course; finally, the incoming third edition is expected to describe the long-term consequences of COVID-19 and, possibly, the efficacy of specific rehabilitation interventions, thanks to the growing availability of analytical cohort studies and clinical trials, respectively.

Table 2. First twenty places of Web of Science most cited 2020 papers in Physical and Rehabilitation Medicine journals at the search date (March 19, 2021). Apart from two papers that did not directly cite COVID-19 in the title but were somehow related to it (long term effects of the previous coronavirus outbreaks, 4<sup>th</sup> place, and telerehabilitation for children 16<sup>th</sup> place), it is possible to find a paper unrelated to the pandemic at the 16<sup>th</sup> place only.

Rank	Citations	Authors	Title	Reference
1	43	Simpson, Robert; Robinson, Larry	Rehabilitation after critical illness in people with COVID-19 infection	American Journal of Physical Medicine and Rehabilitation 2020 Jun;99(6):470-474.
2	38	Stam, Henk J.; Stucki, Gerold; Bickenbach, Jerome	COVID-19 and post intensive care syndrome: a call for action	Journal of Rehabilitation Medicine 2020 Apr 15;52(4):jrm00044
3	35	Brugliera, Luigia; Spina, Alfio; Castellazzi, Paola; Cimino, Paolo; Tettamanti, Andrea; Houdayer, Elise; Arcuri, Pietro; Alemanno, Federica; Mortini, Pietro; Iannaccone, Sandro	Rehabilitation of COVID-19 patients	Journal of Rehabilitation Medicine Jun 2020 Apr 15;52(4):jrm00046.
4	24	Kiekens, Carlotta; Boldrini, Paolo; Andreoli, Arnaldo; Avesani, Renato; Gamna, Federica; Grandi, Maurizio; Lombardi, Francesco; Lusuardi, Mirco; Molteni, Franco; Perboni, Alberto; Negrini, Stefano	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	European Journal of Physical and Rehabilitation Medicine 2020 Jun;56(3):323-326.
4	24	Ahmed, Hassaan; Patel, Kajal; Greenwood, Darren C.; Halpin, Stephen; Lewthwaite, Penny; Salawu, Abayomi; Eyre, Lorna; Breen, Andrew; O'Connor, Rory; Jones, Anthony; Sivan, Manoj	Long-term clinical outcomes in survivors of severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) coronavirus outbreaks after hospitalisation or ICU admission: a systematic review and meta-analysis	Journal of Rehabilitation Medicine 2020 May 31;52(5):jrm00063.
6	23	Boldrini, Paolo; Bernetti, Andrea; Fiore, Pietro	Impact of COVID-19 outbreak on rehabilitation services and Physical and Rehabilitation Medicine physicians' activities in Italy An official document of the Italian PRM Society (SIMFER)	European Journal of Physical and Rehabilitation Medicine 2020 Jun;56(3):316-318.
7	21	Koh, Gerald Choon-Huat; Hoening, Helen	How should the rehabilitation community prepare for 2019-nCoV?	Archives of Physical Medicine and Rehabilitation 2020 Jun;101(6):1068-1071.
8	15	Negrini, Stefano; Kiekens, Carlotta; Bernetti, Andrea; Capecci, Marianna; Ceravolo, Maria G.; Lavezzi, Susanna; Zampolini, Mauro; Boldrini, Paolo	Telemedicine from research to practice during the pandemic Instant paper from the field on rehabilitation answers to the COVID-19 emergency	European Journal of Physical and Rehabilitation Medicine 2020 Jun;56(3):327-330.
8	15	Li, Jianan	Rehabilitation management of patients with COVID-19: lessons learned from the first experience in China	European Journal of Physical and Rehabilitation Medicine 2020 Jun;56(3):335-338.
8	15	Ceravolo, Maria G.; de Sire, Alessandro; Andrenelli, Elisa; Negrini, Francesco; Negrini, Stefano	Systematic rapid living review on rehabilitation needs due to COVID-19: update to March 31, 2020	European Journal of Physical and Rehabilitation Medicine 2020 Jun;56(3):347-353.
8	15	Negrini, Stefano; Grabljevec, Klemen; Boldrini, Paolo; Kiekens, Carlotta; Moslavac, Sasa; Zampolini, Mauro; Christodoulou, Nicolas	Up to 2.2 million people experiencing disability suffer collateral damage each day of COVID-19 lockdown in Europe	European Journal of Physical and Rehabilitation Medicine 2020 Jun;56(3):361-365.
12	14	Carda, Stefano; Invernizzi, Marco; Bavikatte, Ganesh; Bensmail, Djamel; Bianchi, Francesca; Deltombe, Thierry; Draulans, Nathalie; Esquenazi, Alberto; Francisco, Gerard E.; Gross, Raphael; Jacinto, Luis	The role of physical and rehabilitation medicine in the COVID-19 pandemic: The clinician's view	Annals of Physical and Rehabilitation Medicine 2020 Nov;63(6):554-556.

		Jorge; Moraleda Perez, Susana; O'Dell, Michael W.; Reebye, Rajiv; Verduzco-Gutierrez, Monica; Wissel, Joerg; Molteni, Franco		
12	14	Andrenelli, Elisa; Negrini, Francesco; de Sire, Alessandro; Arienti, Chiara; Patrini, Michele; Negrini, Stefano; Ceravolo, Maria G.	Systematic rapid living review on rehabilitation needs due to COVID-19: update to May 31, 2020	European Journal of Physical and Rehabilitation Medicine 2020 Aug;56(4):508-514.
12	14	de Sire, Alessandro; Andrenelli, Elisa; Negrini, Francesco; Negrini, Stefano; Ceravolo, Maria G.	Systematic rapid living review on rehabilitation needs due to COVID-19: update as of April 30, 2020	European Journal of Physical and Rehabilitation Medicine 2020 Jun;56(3):354-360.
15	13	Mukaiho, Masahiko; Tatemoto, Tsuyoshi; Kumazawa, Nobuhiro; Tanabe, Shigeo; Katoh, Masaki; Saitoh, Eiichi; Otaka, Yohei	Staying active in isolation: Telerehabilitation for individuals with the severe acute respiratory syndrome coronavirus 2 infection	American Journal of Physical Medicine and Rehabilitation 2020 Jun;99(6):478-479.
16	12	Camden, Chantal; Pratte, Gabrielle; Fallon, Florence; Couture, Melanie; Berbari, Jade; Tousignant, Michel	Diversity of practices in telerehabilitation for children with disabilities and effective intervention characteristics: results from a systematic review	Disability and Rehabilitation 2020 Dec;42(24):3424-3436.
16	12	Negrini, Stefano; Ferriero, Giorgio; Kiekens, Carlotta; Boldrini, Paolo	Facing in real time the challenges of the COVID-19 epidemic for rehabilitation	European Journal of Physical and Rehabilitation Medicine 2020 Jun;56(3):313-315.
16	12	Borg, Kristian; Stam, Henk	Covid-19 and Physical and Rehabilitation Medicine	Journal of Rehabilitation Medicine 2020 Apr 15;52(4):jrm00045.
16	12	Grieve, Brian; Shapiro, Gabriel D.; Wibbenmeyer, Lucy; Acton, Amy; Lee, Austin; Marino, Molly; Jette, Alan; Schneider, Jeffrey C.; Kazis, Lewis E.; Ryan, Colleen M.	Long-term social reintegration outcomes for burn survivors with and without peer support attendance: A life impact burn recovery evaluation (LIBRE) study	Archives of Physical Medicine and Rehabilitation 2020 Jan;101(15):S92-S98.
20	11	Lopez, Marielisa; Bell, Kathleen; Annaswamy, Thiru; Juengst, Shannon; Ifejika, Nneka	COVID-19 Guide for the rehabilitation clinician: A review of nonpulmonary manifestations and complications	American Journal of Physical Medicine and Rehabilitation 2020 Aug;99(8):669-673.
20	11	Khan, Fary; Amatya, Bhasker	Medical rehabilitation in pandemics: Towards a new perspective	Journal of Rehabilitation Medicine 2020 Apr 14;52(4):jrm00043.
20	11	Bobos, Pavlos; Nazari, Goris; Lu, Ze; MacDermid, Joy C.	Measurement properties of the hand grip strength assessment: A systematic review with meta-analysis	Archives of Physical Medicine and Rehabilitation 2020 Mar;101(3):553-565.
20	11	Wade, Derick T.	What is rehabilitation? An empirical investigation leading to an evidence-based description	Clinical Rehabilitation 2020 May;34(5):571-583.
20	11	Douglas, Jacinta; Bigby, Christine	Development of an evidence-based practice framework to guide decision making support for people with cognitive impairment due to acquired brain injury or intellectual disability	Disability and Rehabilitation 2020 Feb;42(3):434-441.
20	11	Shirazipour, Celina H.; Evans, M. Blair; Leo, Jennifer; Lithopoulos, Alexander; Ginis, Kathleen A. Martin; Latimer-Cheung, Amy E.	Program conditions that foster quality physical activity participation experiences for people with a physical disability: a systematic review	Disability and Rehabilitation 2020 Jan;42(2):147-155.

Figure 1. Prominent PRM journals publications on COVID-19 and rehabilitation this year was different. Journals with the highest clinical interest published more papers even in front of a lower than usual level of evidence, recognising the need for clinicians of some evidence instead of nothing. EJPRM: European Journal of Physical and Rehabilitation Medicine; AJPM&R: American Journal of Physical Medicine and Rehabilitation; JRM: Journal of Rehabilitation Medicine; APRM: Annals of Physical and Rehabilitation Medicine; APM&R: Archives of Physical Medicine and Rehabilitation; CR: Clinical Rehabilitation; D&R: Disability and Rehabilitation.



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9. Kiekens C, Boldrini P, Andreoli A, Avesani R, Gamna F, Grandi M, Lombardi F, Lusuardi M, Molteni F, Perboni A, Negrini S. 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. *Eur J Phys Rehabil Med.* 2020;56(3):323-326.
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