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Supplementary Table S1: Main characteristics of the articles included (n=72)

Author(s), Year, Study Design	Sample size or Number of Included Studies	Cognitive assessment scales	Other assessments	Main results	Limitations of the study
Ceban et al. (2022) [1] Systematic review and Meta-Analysis	N = 81 studies, 43 of which evaluating cognitive impairment	- MoCA - BRB-NT - OMC - MMSE - BACS	- Laboratory testing (inflammatory parameters)	- Subjects with cognitive impairment = 22% - No statistically significant differences in cognitive impairment between female and males or between hospitalized and non-hospitalized patients - 9 of 14 studies reported the presence of both proinflammatory markers and cognitive impairment	- Lack of pre-COVID cognitive assessments - Samples not stratified by disease severity - Findings may not directly result from the infection - Recruitment bias - Use of cognitive screening tools and measures of general cognitive functioning -
Crivelli et al. (2022) [2] Systematic review and Meta-Analysis	N = 32 studies N of subjects = 2103 patients (56% M) N of healthy controls = 506 (50% M)	- MoCA - MMSE - FAB - TICS-M - TMT - SCT - CPT - Digit span - RAVLT - BVMT-R - CVLT - SCID-D - Stroop	- BDI - PHQ-9 - GAD-7 - Cerebral FDG-PET	- Significantly lower scores in cognition in the post-COVID-19 patient group compared to controls - Deficits in global scores of screening measures and sub-scores of attention, memory, and executive functions - Meta-analysis reported an effect of COVID-19 infection on the total MoCA score (MD=−0.94, 95% CI −1.59, −0.29; P = .0049) - Meta-regression analysis reported that an increase in age correlates with enhanced cognitive dysfunction	- Some studies designed with small sample sizes - Use of cognitive screening tools and measures of general cognitive functioning - Findings may not directly result from the infection - Heterogeneity of the outcome of the assessments - Heterogeneous samples - Lack of long-term follow-up
Tavares-Junior et al. (2022) [3] Systematic review	N = 22 studies	- MoCA	- RMN - PET	- Cognitive impairment varied from 2.6% to 81% within the samples considered. - The studies did not find specific alterations in structural neuroimaging exams, except two studies that found	- Lack of pre-COVID cognitive assessment - Methodological differences between the study designs

				frontoparietal hypometabolism in patients with encephalopathy	- Lack of control groups in some studies
Schou et al. (2021) [4] Systematic review	N = 66 studies	- MMSE - MoCA - CogState - PROMIS - TMT - SCT - CPT - Digit span - RDS	- MRI scans at the 3-month follow-up - CRP - LDH - CFQ - STAI - BDI	- 11 studies reported cognitive deficits in >25% of their patient populations - Deficits in concentration problems, memory, attention, language, praxis abilities, encoding and verbal fluency - MRI scans showed that impaired patients displayed higher bilateral grey matter volume loss in the hippocampus	- Lack of control groups - Heterogeneous sample sizes - Study instruments not always appropriate
Vanderlind et al. (2021) [5] Systematic review	N = 33 studies	- MoCA - MMSE - TICS-M	- MRI	- 15.0–40.0% of participants presented cognitive impairment 10–105 days after hospital discharge - The most affected domains were sustained attention, executive function attention, memory and language - Subjects treated with oxygen therapy had lower scores in the domains of memory, attention, working memory, processing speed, executive function, and global cognition	- Limited time frame of evaluations - Sample not stratified by disease severity
Altuna et al. (2021) [6] Narrative review	N =154 studies	- MoCA - MMSE - CPT	- Laboratory testing (inflammatory parameters) - MRI - Brain FDG-PET	- Cognitive sequelae are frequent after COVID-19, even in mild cases not requiring hospitalization or ICU admission - Most affected domain was executive function - Frontoparietal hypometabolism correlated with MoCA performance	- Use of cognitive screening tools and measures of general cognitive functioning
Daroische et al. (2021) [7] Review	N = 12 studies	- MoCA - MMSE - TICS - TMT-A - FAB - Tests of memory	- NA	- The percentage of patients with global cognitive impairment ranged from 15% to 80%	- Small number of studies

				- Impairment on attention and executive functions - Some studies reported memory difficulties, with two studies reporting short-term memory deficits	
Rabnovitz et al. (2020) [8] Review	N =14 studies	- MoCA - Brief Memory and Executive Test - Dyscontrol Scale - Repeatable Battery for the Assessment of Neuropsychological Status - Weekly Calendar Planning Activity - Executive Function Performance Test - Kettle Test	- HADS - Geriatric Depression Scale-short form	- Survivors of COVID-19 who are extubated appear to be experiencing high rates of cognitive impairment, anxiety, and mood symptoms. - Most patients exhibited a dysexecutive syndrome consisting of inattention, disorientation, and difficulties organizing response to command	- Heterogeneous sample (not stratified by disease severity) - Lack of pre-COVID cognitive assessments - Use of cognitive screening tools and measures of general cognitive functioning
Weihe et al. (2022) [9] Prospective cohort	N= 105 patients (100% hospitalized in ICU; median age 67y; 70% M)	- MiniMoCA (telephone interview)	- EQ-5D-5L - ADL - IADL - FAS - CFS	- 26% (n=27) had cognitive scores indicating impaired cognitive function (MiniMoCA <11) at 6 months, and 17% (n=16) at 12 months. - No association was found between cognitive function and time on ventilator.	- Small sample size - Large number of dropouts - Lack of pre-COVID cognitive assessments
Bonizzato et al. (2021) [10] Prospective cohort study	N=12 (mean age 71.33y; 58,3 % M)	- MMSE - MoCA - Digit span forward and backwards - RAVL - SPART - SDMT - TMT - Stroop Test - FAB - Fonemic Fluency FAS	- NPI - AD-R	-Number of patients with test scores below the threshold values: - MMSE: o T0(58, 3%- 7/12) o T1(33,3%- 4/12) o T2(25%- 2/8) - MoCA: o T0(50%- 6/12) o T1(50%- 6/12) o T2(50%- 4/8) No significant differences were found over time in MMSE and MoCA total scores	- Small sample size - Large number of dropouts - Heterogenous sample (not stratified by age)
Holdsworth et al. (2022) [11]	N= 205 (mean age 39y; 83,4%	- NIH-TB	- FAS - GAD-7	- The fluid composite scores were lower than crystallized composite	- Control sample not matched by age and weight

Prospective cohort	M; 100% hospitalized) N of controls = 146630 (mean age 31.8y; 89% M)		- PHQ-9	scores by a mean difference in T-score of 4.7 ($p<0.001$). - Cognitive scores did not differ significantly between community and hospitalized patients	- Use of cognitive screening tools and measures of general cognitive functioning
Rubega et al. (2022) [12] Prospective cohort	N= 33 patients (73% M, 100% hospitalized) N of controls = 12 (67% M)	- MoCA - FAB - Stroop task - Digit Span forward and backward - RAVLT - SDMT - TMT	- BDI - PTSD - PCS-12 and MCS-12 - PSQI - EEG	- Trend towards worse performance in executive functions in patients, in particular in non-ICU patients - Higher likelihood of PTSD correlated to a worse performance in Digit span backward and TMT-B - A higher score in BDI is correlated to a lower score in MoCA - Multiple linear regression analyses highlighted that non-ICU patients got lower scores in cognitive tasks evaluating executive function and working memory	- Small sample size - Lack of face-to-face cognitive evaluation
Vialatte de Pémille et al. (2022) [13] Prospective cohort	N= 13 (mean age 62 y; 61,5% M;100% hospitalized in ICU)	- MMSE - FAB - 40 Words oral naming test - Dubois five words test - Digit span forward and backward - Similarities test of the WAIS IV - Brixton test - Stroop Color - Word Test - Victoria version - Categorical and lexical verbal fluencies - Common bedside praxis	- MADRS	- A total of 92% patients exhibited abnormal global cognitive function according to the MMSE score and 46% had space and temporal disorientation. - Significant differences between baseline and follow-up evaluations were observed for two of the five global tests: MMSE and FAB test	- Small sample size - Lack of brain imaging evaluations
García-Sánchez et al. (2022) [14] Prospective cohort	N= 63 (mean age 51.1y; 35% M; 52,4% hospitalized)	- MoCA - CPT-II - RAVLT - ROCFT - BNT - Digit Span Forward and Backward - Block Design - Coding test	- CRP levels - AST - ALT - LDH - CK - Hemoglobin - Platelets - Leukocytes - Lymphocyte - D-dimer	- Multiple-domain impairment (60.3%) was more frequent than impairment in only one domain (39.7%) - Attention deficits were the most frequent types of deficits in patients with single domain impairment	- Lack of control group -

		- Symbol Search - TMT - Stroop verbal fluency tasks - 15-Objects Test	- Ferritin - IL-6		
Vannorsdall et al. (2022) [15] Prospective cohort	N=82 (mean age 54.5y; 34% M; 100 % hospitalized)	- RAVLT - Oral TMT-A and B - Digit span forward and backward - Letter-cued verbal fluency - Category-cued verbal fluency	- PHQ-9 - GAD-7 - IES-6 - QDRS	- Post-ICU clinic patients produced lower cognitive composite scores than non-ICU patients • Mean post-ICU = 90.6 (SD = 11.0) • Mean non-ICU = 95.8 (SD = 10.3) - Non-ICU patients= 0.28 standard deviations below demographic expectation - Post-ICU patients= 0.63 standard deviations below expectation	- Sample may not be representative of the entire affected population - Lack of pre-COVID cognitive assessment - Lack of control group - Methodological bias (those who could not complete tasks were excluded) - Lack of follow-up
Frontera et al. (2021) [16] Prospective cohort	N = 395 patients N of controls= 395 patients Both= mean age: 68.0y; 65% M, 100% hospitalized)	- MoCA (telephone interview)	- NeuroQol	- Both groups of patients had high rates of cognitive impairment= 50% at 6-months. - In the cohort with neurological complications, 50 had impaired cognition	- Methodological bias (control group was equally affected by COVID-19) - Findings may not directly result from the infection - Use of cognitive screening tools and measures of general cognitive functioning
Evans et al. (2021) [17] Prospective cohort	N = 1077 patients (mean age 57.9 y; 64,3% M;100% hospitalized)	- MoCA (888 patients)	- BNP - NT-BNP - eGFR - HbA1C - D-dimer - CRP - EQ-5D-5L - PHQ-9 - GAD-7	- 16,9% of patients showed a MoCA score < 23 - The severity of physical and mental health impairments was closely related, whereas cognitive health impairments were independent - Age had a non-linear association, with age groups <30 years and >70 years perceiving better recovery than those aged 50–59 years	- Sample may not be representative of the entire affected population

Miskowiak (2021) [18] Prospective cohort	N =29 patients (mean age 56.2; 59% M; 100% hospitalized)	- SCIP-D - TMT- B	- Biomarkers of inflammation - WPAI - EQ-5D-5L	- 65% suffer from clinically relevant cognitive impairments (most affected: verbal learning and executive function; moderate impairments: working memory, verbal fluency and psychomotor speed. - Higher maximum d-dimer levels correlated with poorer verbal recall and psychomotor speed. - Poorer verbal memory and lower psychomotor speed correlated with higher d-dimer levels	- Small sample size - Lack of control group - Methodological bias (cross-sectional design) - Use of cognitive screening tools and measures of general cognitive functioning
Graham et al. (2021) [19] Prospective cohort	N = 100 (mean age 43.2y; 30% M; Non hospitalized)	- NIH-TB v2.1 (36% of the cohort: 48% COVID+/ 24% COVID-)	- Markers of inflammation - PROMIS quality of life (subjective) - Brain MRI - Spine MRI - EEG - EMG	- PROMIS and NIH Toolbox results were not significantly different between patients and controls - SARS-CoV-2+ patients had significantly worse NIH Toolbox cognitive function in attention and working memory domains. - Both patients and controls had significantly worse than expected PROMIS quality of life for cognition - No difference between the two groups was found at imaging	- Small sample size - Sample may not be representative of the entire affected population - Lack of face-to-face cognitive evaluation - Lack of pre-COVID cognitive assessments - Lack of follow-up - Methodological bias (not every patient had the same set of laboratory, imaging, and neurophysiologic testing)
Mattioli et al. (2021) [20] Prospective cohort	N = 120 patients (mean age 47.86y; 25% M) N of controls= 30 (mean age 45.73y; 26.7% M)	- COWA - RCFT - CVLT - TEA attention test - Tower of London - MMSE	- DASS-21	- The mean number of impaired neuropsychological tests was 1.69 in COVID-19 and 1 in non-COVID-19 subjects (not statistically significant) - Mean scores of all the neuropsychological tests were not statistically different	- Sample not stratified by disease severity - Lack of pre-COVID cognitive assessments
Hosp et al. (2021) [21] Prospective cohort	N = 29 (mean age 65,2y; 62% M; 100% hospitalized)	- MoCA - HVLT-R - Digit span forward and reverse	- Brain MRI - 18-FDG PET imaging	- Impaired performance on the MoCA in 18/26 patients (3 did not complete evaluations)	- Selection bias (only younger people accepted the evaluations)

		- SDMT - TMT-A and B - Semantic fluency test - Phonemic fluency test - Stroop test		○ 54% were mild to moderate impaired ○ 15% were severely impaired ○ The most affected domains were executive abilities, visuoconstruction, memory and attention - 13/15 patients had low scores in the extensive battery ○ Memory and executive functions were the most affected domains - There was a highly significant linear relationship between cognitive assessment and PET (a higher pattern expression score was associated with worse cognitive performance)	- Sample may not be representative of the entire affected population
Leth et al. (2021) [22] Prospective cohort	N = 49 (mean age 58 y; 43% M; 100% hospitalized)	-OMCTest	NA	- 39% after 6 weeks and 45% after 12 weeks reported concentration difficulties - 21% after 6 weeks and 11% after 12 weeks showed impaired OMC test	- Small sample size - Single-center study - Lack of control group. - Lack of objective measurements - High rates of loss to follow-up
Puchner et al. (2021) [23] Prospective cohort	N = 23 of which 14 underwent cognitive evaluations (mean age 57y; 70% M; 100% hospitalized)	- Logical Memory I & II of WMSIV - VVM - TAP	- HADS-D - IES	- In 29% of the tested patients, cognitive deficits of concentration, memory, and/or executive functions were found.	- Lack of control group - Small sample size
Soldati et al. (2021) [24] Prospective cohort	N=23 patients (mean age: 53.6y; 78,2% M; 100% hospitalized in ICU)	- TICS-M (telephone interview)	- EuroQol (quality of life assessment)	- No patients with severe cognitive impairment - 13% exhibited mild cognitive impairment - Patients with mild cognitive impairment in TICS tended to have a low EuroQol score	- Lack of control group
Latronico et al. (2021) [25] Prospective cohort	N = 114 patients (mean age 60y; 75% M; 100%	- MoCA	- SF-36 - HADS - EMG	- N (%) of patients with Mild Cognitive Impairment= 23 (3 months); 16 (6 months); 7 (12 months)	- Single-centre study - Follow-up evaluations

	hospitalized in ICU)			- N. (%) of patients with Moderate or Severe Cognitive Impairment = 2 (3 months); 1 (6 months); 0 (12 months)	possible in only half the sample
Venturelli et al. (2021) [26] Prospective cohort	N = 767 (mean age: 63y; 67,1% M; 87% hospitalized with 8,6% of them requiring ICU admission)	- MoCA	- Full blood panel and clinical biochemistry - IES-R - HADS - RSA	- MoCA was pathologic in just 2 out of the 304 patients who were tested	- Timeline of enrolment and assessments was not standardized - Sample may not be representative of the entire affected population - Lack of pre-COVID cognitive assessments
Mazza et al. (2021) [27] Prospective cohort	N=226 (mean age 58.5y; 66% M; 78,3 % hospitalized)	- BACS (on 130 patients)	- Baseline systemic immune-inflammation index (SII) - IES-R - STAI-Y - BDI-13 - ZSDS - WHIIRS	- 16% were poor performers in at least one function, 17% in two, 14% in three, 11% in four, 5% in five, and 1.5% showed no good performance at all. - Patients with psychopathology one-month after discharge performed worse on verbal fluency, information processing and executive functions at the three months assessment	- Cognitive assessment not performed in the entire sample - Single-center study
Raman et al. (2021) [28] Prospective cohort	N = 58 (mean age: 55.4y; 58,6% M; 100% hospitalized) N of controls = 30 COVID -	- MoCA	- MRI scan - GAD-7 - PHQ-9 - FSS - Complete blood count and clinical biochemistry	- MoCA scores: ≤4 in 40% patients vs 16% in controls - 28% had a total MoCA score that was abnormal compared to 17% of controls. - The cognitive profile observed (primarily dysexecutive) among patients is also consistent with a vascular pattern, observed through MRI scans	- Small sample size - Single-center study - Lack of pre-COVID cognitive assessment and imaging - Lack of follow-up
Dressing et al. (2021) [29] Prospective cohort	N = 31 (mean age 53.6; 35,5% M; not hospitalized)	- MoCA	- Cerebral 18F-FDG PET	- The mean z scores of verbal and visual memory domains and composite z score were not significantly different from zero	- Small sample size - Lack of pre-COVID cognitive assessments and imaging

				- The mean z scores for executive functions, attention and speed of processing were even higher than zero and, in total, almost 49% were completely unimpaired in the neurocognitive test battery - MoCA performance= mild impairment was detected in 9 patients (29%; range, 23–25 point	
Van der Borst et al. (2021) [30] Prospective cohort	N = 124 (mean age 59y; 60% M)	- TICS	- HADS - CFQ - PCL-5	- 15% of patients scored <34 on TICS	- Small sample size - Single center study - Lack of pre-COVID 19 cognitive assessments
Monti et al. (2021) [31] Prospective cohort	N = 39 (mean age 56y; 90% M; 100% hospitalized)	- Itel-MMSE	- HADS - EQ5D-3L - PCL-5 - ISI	- After a median of 61 days after ICU discharge, only one patient (2.6%) had cognitive impairment at the Itel-MMSE scale	- Small sample size - Short follow-up period - Lack of face-to-face cognitive evaluations - Single center study
Del Brutto et al. (2020) [32] Prospective cohort	N = 93 (mean age 62.6y; 37% M)	- MoCA	- MRI - EEG	- Cognitive decline in 21% of individuals with mild symptomatic SARS-CoV-2 infection, and only in 2% asymptomatic seronegative individuals. - 13% individuals had a reduction in the post-pandemic MoCA that was ≥4 points larger than the reduction that occurred between two pre-pandemic MoCA assessments. - Post-pandemic EEGs disclosed abnormalities in two individuals (both were SARS-CoV-2 seropositive and had cognitive decline). - Post pandemic MRIs were normal in the 12 individuals with	- Small sample size - Sample not stratified by age - Use of cognitive screening tools and measures of general cognitive functioning - Methodological bias (Scalp EEG recordings may miss an infrequent epileptiform activity or focal slowing)

				cognitive decline, including the two with abnormal EEGs	
Morin et al. (2021) [33] Prospective cohort	N = 478 (mean age 60.9y; 57.9% M; 100% hospitalized)	- Q3PC cognitive screening questionnaire - MoCA - D2-R test	N/A	- Cognitive impairment was confirmed in 38.4% of patients, more commonly in patients aged 75 years or older - Memory difficulties were reported by 17.5%, mental slowness by 10.1%, and concentration problems by 10% more than once a week	- Lack of control group - Sample may not be representative of the entire population
Rass et al. (2021) [34] Prospective cohort	N = 135 (mean age 56.0y; 61% M; 72,53% hospitalized)	- MoCA	- SF-36v2 - PCL5 - HADS	- Cognitive deficits were found in 23% of patients (in severe COVID-19 patients 29%, moderate 30%, mild 3%) - 34% reported sleep disturbances 3 months after COVID-19.	- Lack of pre-COVID cognitive assessment - Lack of long-term follow-up - Sample not stratified by disease severity
Almeria et al. (2020) [35] Prospective cohort	N = 35 (mean age 47.6y; 45,7% M)	- Global cognitive Index - TAVEC - WMS-IV - TMT-A and B - SDMT - Stroop, Phonemic and Semantic fluency and Boston Naming Test from the NEURONORMA project	- Laboratory testing (D-dimer, ferritin) - HADS	- Cognitive impairment in patients that required oxygen therapy during hospitalization - Patients with headache and clinical hypoxia scored lower in the global Cognitive Index - T- score lower than 30 was observed in memory domains, attention and semantic fluency and mental flexibility and in phonetic fluency	- Small sample size - Evaluations performed right after the infection.
Cian et al. (2022) [36] Prospective cohort	N = 29 COVID + (58,62% M, 100% hospitalized) N of controls COVID - = 29	-MMSE -RAVLT -CPM47 -CDT -The phonemic/semantic and alternate fluency test -Digit Span Forward and Backward	- STAI - BDI-II	- Significant differences were found between groups in the RAVLT scores (learning, recall, and recognition) - Significant difference between groups in Digit backward test - The number of people with at least one pathological score was higher in the COVID+ group than in controls	- Small sample size. - Methodological bias (exploratory study). - Lack of face-to-face cognitive evaluations - Lack of neuroimaging correlates of the findings
De Lorenzo et al. (2020) [37] Prospective and retrospective cohort study	N = 185 (mean age 57y; 66,5% M; 68,1% hospitalized)	- MoCA	- WHOQOL - IER - STAI - WHIIRS	At follow-up, 25.4% achieved MoCA scores compatible with cognitive impairment	N/A

Walle-Hansen et al. (2021) [38] Retrospective cohort study	N = 106 patients (mean age 74,3y; 57% M; 100% hospitalized)	- MoCA	- EQ-5D-5L - ADL - SPPB	- The mean sum scores of both MoCA and SPPB were lower in the oldest age group - 43% of the patients experienced a negative change in cognitive function 6 months after the COVID-19 hospitalization (more cognitive decline among persons >75y compared to younger persons)	- Short follow-up period; single follow-up evaluation - Recall bias for the pre-COVID assessment - Sample with same disease severity
Patel et al. (2021) [39] Retrospective cohort study	N = 77 (mean age 61.03y; 63,6%M; 31,8% acute hospitalization)	- MoCA	- QI-SC	- 80.5% demonstrated cognitive deficits on the MoCA at admission: 51% mild deficits, 26% moderate deficits and 4% severe deficits. - At discharge, 78% continued to exhibit cognitive impairment on the MoCA. - The 45 patients with admission and discharge MoCA scores improved on the MoCA	- Lack of discharge cognitive data - Sample with same disease severity
Manera et al. (2021) [40] Retrospective cohort study	N = 152 (mean age 67.0y; 66,4% M; 48,7% ICU)	- MMSE	- NA	- Impaired MMSE performances were highly prevalent in mild-to-moderate patients (26.3%) - Below-cutoff MMSE percentage was visibly higher in Neuro+ (16.5%) vs. Neuro− (4.1%) patients. - Within severity degrees, impaired MMSE performances were notably more frequent for mild-to-moderate (26.3%). - A trend toward a lower prevalence of defective MMSE scores was detected in ICU-admitted patients (19.2%)—when descriptively compared to those not admitted (5.4%). - ICU admission predicted a higher probability of responding correctly to constructional praxis	- Use of screening tools and measures of general cognitive functioning

				item—when compared to non-admission	
Sardella et al. (2022) [41] Cross-sectional study	N = 71 (mean age 80,7 y; 30% M; not hospitalized)	- Itel-MMSE (Italian telephone version)	- BADL - IADL - SF-12 - PCS - MCS	- Patients reported significantly lower scores on the MMSE at t2 compared to the scores obtained at baseline	- Small sample size - Sample not stratified by age - Use of cognitive screening tools and measures of general cognitive functioning
Abdelghani et al. (2022) [42] Cross-sectional study	N = 85 patients (mean age: 35.95y; 18.8 % M; not hospitalized-asymptomatic) N of controls = 85 (mean age: 33.68y; 27.1 % M)	- MoCA	- HADS	- Patients were more likely to have cognitive impairment than the control subjects - Patients had a significant decline in visuo-executive skills, naming, attention, language, abstraction, and delayed recall - Even after being adjusted for associated anxiety and depressive symptoms, patients had greater odds of cognitive impairment	- Methodological bias (cross-sectional design) - Single-center design - Small sample size - Use of cognitive screening tools and measures of general cognitive functioning
Aiello et al. (2022) [43] Cross-sectional study	N = 54 of which 37 RCD* + (mean age 70.30y; 40,5% M) and 17 RCD* – (mean age 69.59y; 58,8% M) *at least one neurological/ psychiatric condition possibly affecting cognition	- MMSE - ACE-R - FAB - Attentional Matrices (28 patients)	- N/A	- Prevalence of defective MMSE scores was - 24.3% in RCD + patients and 5.9% in the RCD – group. - ACE-R-total below-cutoff scores were less frequent (RCD + 5.4%; RCD – 5.9%). - In both groups, no effects of disease severity, ICU admission, steroidal treatment, and co-occurring infection were detected on adjusted cognitive scores—except for cooccurring infections on ACE-R-F and ICU admission rates on FAB-3 scores in RCD – patients	- Small sample size - Use of cognitive screening tools and measures of general cognitive functioning
Bolattürk et al. (2022) [44] Cross-sectional study	N = 40 patients (mean age: 51.3y; 55 % M; 100% hospitalized)	- MoCA - MMSE	- PSQI - HAM-A - HAM-D	- Early-stage cognitive impairment was detected in 15% of patients - MMSE was normal in 85% of patients and the mean MMSE score of	- Small sample size - Short follow-up period - Lack of control group

				the patients was 26.9±2.1 - MoCA test was positive in 55% of the patients, and the mean MoCA score of the patients was 19.6±5.2 - Significant correlation of MoCA scores and HAM-D	
Cecchetti et al. (2022) [45] Cross-sectional study	N = 49 (baseline) and 33 (follow-up) (mean age 60.8y; 73,4% M; 85,7% hospitalized) N of controls = 36 (for cognitive and MRI); 33 (for EEG)	- MMSE - FAB - SDMT - TMT-A and B - RAVLT - Digit span forward and backward - VOSP - SAND	- EEG - MRI (3T) (36 patients)	- 53% of patients had disturbances in at least one cognitive domain 2 months after COVID-19 resolution with a main involvement of the executive functions - The most affected domains were executive functions, memory and visual-spatial, domain - 25% of subjects showed a multidomain impairment - At follow-up, 36% of patients showed an impairment in at least one cognitive domain - Compared with healthy controls, patients performed worse in all investigated domains	- Small sample size - Lack of pre-COVID cognitive, EEG or MRI assessments - - Methodological bias (19-channel EEG has a low spatial resolution and precluded the CSD and LLC analyses at sub-regional level; longitudinal MRI data was not acquired) - A control cohort with subacute respiratory dysfunction or viral infections different from COVID-19 was not enrolled
Guo et al. (2022) [46] Cross-sectional study	N = 421(181 patients COVID +; 28,2% M) N of controls = 185 patients (36,2% M)	- WCST - Pictorial Associative Memory Test - Category Fluency Test - Word List Recognition Memory Test - 2D Mental Rotation Test - Number Counting Test - Relational Reasoning test	- NA	- There was a significant negative influence of the COVID-19 infection on memory performance, even when controlling for age, sex, country, and education level.	- Methodological bias (exploratory study) - Lack of face-to-face cognitive evaluation - Sample not stratified by disease severity

Henneghan et al. (2022) [47] Cross- sectional study	N = 72 patients (mean age 36y; 26% M; not hospitalized)	- BrainCheck (web-based battery): o TMT o Digit Symbol Substitution Test o Stroop Test o List Learning Test - PROMIS Cognitive (subjective)	- PROMIS 57 - Perceived Stress Scale	- Results indicated that 40% of participants demonstrated objective cognitive impairment. The largest number of participants showed impairment on executive functions - Median percentage of people with cognitive impairment = 61% - Incidence of cognitive impairment is lower in mild-to-moderate cases - Executive function was the most affected cognitive domain - Greater frequency of impairment on a test of attention and processing speed in males - Moderate severity disease was correlated with attention/processing speed impairment - Younger age was correlated with objective cognitive impairment and higher perceived stress, anxiety and depressive symptoms	- Methodological bias (cross-sectional study) - Lack of control group - Recall bias (lack of pre-COVID cognitive assessment) - Lack of face-to-face cognitive evaluation - Sample may not be representative of the entire affected population
Serrano- Castro et al. (2022) [48] Cross-sectional study	N = 152 cases (mean age 71y: 37% M) N of controls = 40 (mean age 52.2y; 50% M)	- MoCA - TAVEC - FCRST - BNT - DRT - TMT A and B - FAS - RCFT	- Complete blood count and biochemistry - Proinflammatory chemokines and growth factors - STAI - BDI-II	- Impairment in episodic verbal memory was observed in 34.7% to 38.5% - Working memory was affected in 26.4–36.7% of the sample - The scores obtained for attention and orientation were abnormal	- Absence of neuroradiological data
Becker et al. (2021) [49] Cross-sectional study	N = 740 (mean age 49.0y; 37% M; 27% hospitalized)	- Number Span forward and backward - TMT-A and B - Phonemic and category fluency - Hopkins Verbal Learning Test–Revised	- NA	Impaired total: - 10% attention - 10% working memory - 18% processing speed - 16% executive functions - 15% phonemic fluency - 20% category fluency - 24% memory encoding - 23% memory recall - 10% memory recognition -Hospitalized patients were more likely to have impairments in attention,	- Potential sampling bias

				executive functions, category fluency, memory encoding and memory recall than those in the outpatient group.	
Ermis et al. (2021) [50] Cross-sectional study	N=53 (mean age 63y; 60% M; 100% hospitalized)	- MoCA (in acute phase)	- CSF exam - Brain CT or MRI - EEG	- Most of the tested patients (61.5%) showed cognitive impairment with deficits primarily in executive function, attention, language and delayed recall	- Evaluations performed right after the infection.
Jaywant et al. (2021) [51] Cross-sectional study	N = 57 (mean age 64.5y; 75% M; 100% hospitalized)	- BMET	N/A	- 81% had cognitive impairment: o 55% in working memory o 47% in set-shifting o 46% in divided attention o 40% in processing speed	- Single-center study - Sample may not be representative of the entire affected population - Lack of control group - Not all patients completed all subtests of the BMET
Albu et al. (2021) [52] Cross-sectional study	N = 30 (mean age 54y; 63,3% M; 100% hospitalized)	- Barcelona Test Digit Span forward and backward - RAVLT - PMR task	- HADS	- Cognitive impairment was found in 63.3% of patients, with a similar profile in both subgroups.	- Sample may not be representative of the entire affected population - Lack of pre-COVID 19 cognitive assessments
Ferrucci et al. (2021) [53] Cross-sectional study	N = 38 (mean age 53,45y; 71% M; 100% hospitalized)	- MoCA - BRB-NT: o SRT o SPART o SDMT o PASAT o WLG	- BDI-II - SSD questionnaire	- 42.1% showed processing speed deficits - 26.3% showed delayed verbal recall deficits - 10.5% showed deficits in immediate verbal recall - 18.4% showed deficits in visual long-term memory - 15.8% showed deficits in visual short-term memory - 7.9% showed deficits in semantic verbal fluency	- Lack of control group - Lack of pre-COVID cognitive assessment - Sample not stratified by gender
Johnsen et al. (2021) [54]	N = 57 patients (mean age 51 y; 28% M; 44% hospitalized,	- SCIP-D - TMT-B	- WPAI - EQ-5D-5L - CFQ	- The percentage of patients with clinically significant cognitive	- Small sample size - Potential selection bias

Cross-sectional study	36% not hospitalized) *N of patients who received cognitive evaluation= 45			impairment ranged from 51% to 58% - 38–53% of patients showed broad impairments - 4–16% patients showed selective impairments;	- Clinical and laboratory data from non-hospitalized patients during the acute phase were not available.
Liu et al. (2021) [55] Cross-sectional study	N = 1539 (mean age 69y; 47,95% M) N of controls = 466 (mean age 67y; 48,5%M)	- TICS-40 (telephone) - IQCODE (subjective, family questionnaire)	- NA	- Compared with controls, COVID-19 patients had lower TICS-40 scores and higher IQCODE scores - Severe COVID-19 patients had lower TICS-40 scores and higher IQCODE scores than non-severe COVID-19 patients - Severe COVID-19 patients had a higher proportion of cases with current cognitive impairment and longitudinal cognitive decline than non-severe COVID-19 patients - The severity of COVID-19 and ICU admission were found to be associated with an increased risk of cognitive impairment.	- Lack of face-to-face cognitive assessment - Lack of pre-COVID cognitive assessment - A control cohort with subacute respiratory dysfunction or viral infections different from COVID-19 was not enrolled - Potential selection bias - Control group is not matched to sample group
Hellgren et al. (2021) [56] Cross-sectional study	N = 35 (median age 59y; 80% M; 100% hospitalized)	- RBANS	- HADS - MFI - Brain MRI	- 46% showed cognitive impairments o 17% showed mildly/moderately impaired cognition o 29% had severely impaired cognition - Immediate Memory and Delayed Memory were the indices where most patients performed below cut-off	- Lack of global cognitive assessment - Lack of pre-COVID cognitive assessment - Small sample size - Lack of control group
Méndez et al. (2021) [57] Cross-sectional study	N = 179 (mean age 57y; 58,7% M; 100% hospitalized)	- Delayed memory subtests from SCIP - ANT from COWAT - Digit Span backward from WAIS-III	- GAD-7 - PHQ-2 - DTS - SF-12	- 38% of patients presented moderate impairment and 11.2% severe impairment in immediate verbal memory - 11.8% of survivors had moderate impairment and 2.8% had severe impairment in delayed verbal memory	- Single-center study - Lack of face-to-face cognitive evaluations - Large number of dropouts

				- Working memory was moderately impaired in 6.1% and severely impaired in 1.1% of survivors - 58.7% patients met criteria for moderate neurocognitive impairment and 18.4% for severe neurocognitive impairment	
Versace et al. (2021) [58] Cross-sectional study	N= 12 (mean age 67y; 83,3% M; 100% hospitalized)	- FAB	- FRS	- Diminished executive functions, as documented by abnormal scores corrected for age and education on the FAB	- Small sample size with sequelae of inhomogeneous neurological affections
Woo et al. (2020) [59] Cross-sectional study	N = 18 (mean age 42.2y; 44,4% M; 61% hospitalized) N of controls = 18 (mean age 45.8y)	- TICS-M (telephone)	- PHQ-9 - FAS - Analysis of serological parameters during acute COVID-19 - Analysis of cerebrospinal fluid (CSF) - Cranial imaging	- Post-COVID-19 patients scored significantly lower results in the TICS-M compared to healthy controls - 50% reported attention deficits - 44.4% reported concentration deficits - 44.4% reported short-term memory deficits - 27.8% reported troubles in finding words	- Small sample size. - Confounders for cognitive testing such as years of education and substance abuse were not assessed.
Zhou et al. (2020) [60] Cross-sectional study	N =29 (mean age 47.0y; 62% M) N of controls = 29 healthy volunteers (matched by age, gender, education)	- TMT - SCT - CPT (Part 1,2,3) - Digit span	- GAD-7 - PHQ-9 - Blood tests (IL-2/ IL-4/ IL-6/ IL10/ TNF-α/ IFN-γ; CRP)	- The COVID-19 patients had a lower correct number CPT 2 and CPT 3 compared with the controls - There was no significant difference between the two groups in TMT, SCT, or Digit span	- Small sample size - Potential selection bias due to inclusion criteria
Hadad et al. (2022) [61] Cross-sectional study	N= 46 (mean age 50y; 35% M; 67% not hospitalized)	- MoCA	- Brain CT scan - MRI - EEG (in 5 patients) - ADL - IADL	- The total MoCA score of the patients was not statistically different from controls - There was a statistically not significant correlation between the MoCA index scores and disease severity, except a trend-level association with the memory index (- Executive function, language and attention index scores were	- Single-center study - Not all patients attended follow-up evaluation - Lack of a control group - Heterogeneous sample (sample not stratified by age, background and disease severity)

				significantly worse compared to the older normative sample - EEG/ MRI/ CT evaluations were normal in all patients tested	- Normative cognitive data resulted from a group with different social and ethno-racial background - Not all the individuals received the same tests
Miskowiak et al. (2022) [62] Cross sectional study	N at baseline = 71 N at three months follow up= 29 (included for cognition assessment) N at one year follow up= 25 included for cognition assessment (mean age 56y: 52% M; 100% hospitalized)	- SCIP-D - TMT-B	- WPAI - EQ-5D-5L - ED5D - HDRS-17 - CFQ	- 56% reported cognitive impairments compared with their expected: o 48 % fulfilled the criterion for global impairment o 8% were selectively impaired o 44% were cognitively normal - In comparison with HC sample, 48% were identified as cognitively impaired: o 40% with global impairment o 8% with selective impairment o 52% were cognitively normal. - Large effect size on the working memory test - Moderate to large impairments in verbal learning test - immediate, verbal fluency test and psychomotor speed test.	- Small sample size - Lack of control group - Use of screening tools and measures of general cognitive functions
Amalakanti et al. (2021) [63] Case-control study	N = 93 (mean age 36.2y; 47,7% M; not hospitalized) N of controls = 102 (mean age 35.6y; 45,3% M)	- MoCA	N/A	- There was no significant difference in the overall cognitive assessment scores between the two groups - COVID-19 patients secured lower scores than controls in the domains of visuoperception, naming and fluency - COVID positive subjects aged greater than 50 years scored lower in the MoCA when compared to the younger people	- Small sample size

Ortelli et al. (2021) [64] Case-control study	N =12 patients (mean age 67y; 83% M; 100% hospitalized) N of controls = 12, matched by age and sex	- MoCA - FAB - Vigilance Task - Stroop Interference Task - Navon Task	- CRP and IL-6 serum levels - FRS and FSS (fatigue assessment) - BDI - Apathy Evaluation Scale - TMS (central motor excitability assessment)	- MoCA: 15.5/30 (mean score in post-COVID19 patients) - The most affected was the executive domain - FAB: 13.4/18 (mean score in post COVID19 patients), demonstrating evidence of a dysexecutive syndrome	- Lack of long-term follow-up period
Tolentino et al. (2021) [65] Case report	N = 1 (age 47y; M; hospitalized)	- MMSE - CVAT	- GAD-7 - PHQ-9	- The patient suffered from a more limited dysfunction involving the attentional system - A worsening in attention performance on Day 6 preceded the maximum drop in the patient's oxygen saturation	- N/A
Yesilkaya et al. (2021) [66] Case report	N = 1 (age 29y; M; hospitalized)	- FAB - TMT-A and B - CVLT	- GDS - EEG - MRI - CT	- Impairment in memory, executive functioning, motor programming, attention, and concentration - No abnormalities on EEG, conventional MRIs and CT. - No neurologic nor cognitive deficits were detected at the patient's three months follow-ups.	- N/A
Hellmuth et al. (2021) [67] Case series	N = 2 (mean age 44.5y; 100% F)	- MoCA - CVLT - MMSE - Digit span forward and backwards - D-KEFS - TMT - RCFT - NAB	N/A	- RCFT o Cases: 33/36 low average - Figure 2 min delay o Cases: 16/36 below average - Backward Span o Cases: 4 low average - Inhibition/switching o Cases: 77 low average	- N/A
Whiteside et al. (2021) [68] Case series	N = 3 (mean age 70y; 66,7% M; 100% hospitalized)	- Vocabulary Subtest (WAIS-IV) - RDS - HVLT-R - RBANS - Complex Ideational Material subtest from BDAE	- ILS - BAI - GDS	- Neurocognitive deficits particularly in encoding and verbal fluency	- Small sample size - Lack of face-to-face cognitive evaluations

		- O-TMT - TSAT			
Gautam et al. (2021) [69] Case series	N = 200 (mean age 56.5y; 62,5% M; 100% hospitalized)	- MoCA	- EQ-5D-5L	- In 12.5% of patients, some cognitive impairment was noted, mainly in concentration and short-term recall	- Small sample size - Single center study - Sample with same disease severity
Beaud et al. (2020) [70] Case series	N = 13 (mean age 64,7y; 77% M; 100% hospitalized)	- MoCA - FAB	- MRI	- MoCA revealed mild (4 subjects) and moderate-severe (5 subjects) deficits - The most affected were executive, memory, attentional and visuospatial functions - FAB revealed executive dysfunction in eight patients - The most affected subtest was lexical fluency - Cognitive impairment in severe COVID-19, does not correlate with length of mechanical ventilation or length of ICU stay and thus severity of the acute illness.	- N/A
Groiss et al. (2020) [71] Case series	N = 4 (age 59.5y; 100% M; 100% hospitalized)	- MoCA - SDMT - MMSE	- EEG	- All patients showed clinically relevant impairment of cognition - All patients showed signs of central nervous system affection	- Small sample size - Use of cognitive screening tools and measures of general cognitive functioning - Lack of pre-COVID cognitive assessments
Negrini et al. (2020) [72] Case series	N = 9 (mean age 60y; 67% M; 100% hospitalized)	- MMSE - FAB	- STAI - BDI	- 33.3% had a pathologic MMSE score - Lower scores were registered in the domain of attention and calculation, short-term memory, constructional praxia and written language - The cognitive decay appeared to be linearly	- Lack of long-term follow-up period - Small sample size

				associated with the length of stay in the ICU	

ACE-R= Addenbrooke's Cognitive Examination—Revised; **ADL=** Activities of daily living; **ANT=** Animal Name Testing; **BACS=** Brief Assessment of Cognition in Schizophrenia; **BADL=** Bristol Activities of daily living; **BAI=** Beck Anxiety Inventory; **BDAE=** Boston Diagnostic Aphasia Examination; **BDI**= Beck Depression Inventory; **BMET=** Brief Memory and Executive Test; **BNP=** Brain Natriuretic Peptide; **BNT**= Boston Naming Test; **BRB-NT**=Brief Repeatable Battery of Neuropsychological Tests; **BVMT-R=** Brief Visuospatial Memory Test-Revised**; CDT=** Clock Drawing Test; **CFQ=** Cognitive Failures Questionnaire; **CFS=** Clinical Frailty Scale; **CK=** Creatine Kinase**; COWA=** Controlled Oral Word Association by categories; **CPM47=** Colored Progressive Matrices 47; **CPT=** Continuous Performance Test; **CRP=** C-Reactive Protein; **CVLT=** California Verbal Learning Test; **CVAT=** Continuous Visual Attention Test; **D-KEFS=** Delis-Kaplan Executive Functions Test; **DASS-21**= Depression, Anxiety and Stress Scale 21 items; **DRT=** Digit Retention Test; **DTS=** 17- Items Davidson Trauma Scale; **EEG**= Electroencephalography; **EQ-5D-5L** = 5-level EuroQol-5 Dimension; **FAB=** Frontal Assessment Battery; **FAS=** Fatigue Assessment Scale; **FAS=** Verbal Fluency Test; **FCRST=** Free and Cued Selective Reminding Test; **FDG-PET=** Fluorodeoxyglucose Positron Emission Tomography; **FIC=** Functional Impairment Checklist; **FRS=** Fatigue Rating Scale; **FSS=** Fatigue Severity Scale; **FWIT=** Color-Word Interference Test; **GAD-7 =** Generalized Anxiety Disorder-7; **GDS=** Global Deterioration Scale; **GDS=** Geriatric Depression Scale 15-item version; **HADS=** Hospital Anxiety and Depression Scale; **HDRS-17=** Hamilton Depression Rating scale 17-items; **HVLT=** Hopkins Verbal Learning Test-Revised; **IADL=** Lawton-Brody Instrumental Activities of Daily Living; **ICU=** Intensive Care Unit; **IES-6 =** Impact of Events Scale-6; **IES-R=** Impact of Events Scale – Revised; **ILS=** Independent Living Scales; **IQCODE=** Informant Questionnaire on Cognitive Decline in the Elderly; **LDH=** Lactate De-hydrogenase; **MADRS=** Montgomery and Asberg Depression Scale; **MCS=** Mental Component Summary**; MFI=** Multi-dimensional Fatigue Inventory; **MMSE=** Mini Mental State Exam; **MoCA=** Montreal Cognitive Assessment; **MRI=** Magnetic Resonance Imaging; **N/A=** Not Available; **NAB=** Neuropsychological Assessment Battery; **NIH-Toolbox=** National Institutes of Health Toolbox; **NPI=** Neuropsychiatry Inventory; **OMC=** Orientation-Memory-Concentration Test; **OCD=** obsessive-compulsive disorder according to DSM-V; **PASAT=** Paced Auditory Serial Addition Test**; PCL5**= Posttraumatic Stress Disorder Checklist–5; **PCS=** Physical Component Summary; **PHQ-9 =** Patient Health Questionnaire-9; **PROMIS=** Patient-Reported Outcomes Measurement Information System; **PSQI=** Pittsburgh Sleep Quality Index; **QDRS =** Quick Dementia Rating Scale; **QI-SC=** Quality Indicator For Self-Care; **RAVLT** = Rey Auditory Verbal Learning Test; **RBANS=** Repeatable Battery for the Assessment of Neuropsychological Status; **RCFT**= Rey Complex Figure Test; **RDS=** Reliable Digit Span; **RSA=** Resilience Scale for Adults; **SAND**= Screening for aphasia in neurodegeneration; **SCIP-D=** Screen for Cognitive Impairment in Psychiatry Danish Version; **SCT=** Sign Coding Test; **SDMT**= Symbol Digit Modalities Test; **SDSSS=** Stress Disorder Symptom Severity Scale according to the DSM-V; **SF-12=** Short-Form Health Survey 12 item; **SF-36=**36-Item Short-Form Health Survey; **SPART=** 10/36 Spatial Recall Test; **SPHERE-34=** Somatic and Psychologic Health Report-34 item; **SPPB=** Short Physical Performance Battery; **SRT**= Selective Reminding Test; **STAI=** State - Trait Anxiety Inventory; **TAP=** Test of Attentional Performance; **TAVEC**= Test de Aprendizaje Verbal Espana-Complutense; **TICS-40=** Telephone Interview of Cognitive Status-40; **TICS-M=** Telephone Interview of Cognitive Status; **TMT-A**= Trail Making Test-A; **TMT-B**= Trail Making Test-B; **TMT=** Trail Making Test; **TSAT=** Test of Sustained Attention and Tracking; **VVM =**Verbal and visual memory test; **VOSP**= Visual object and space perception battery; **WCST=** Wisconsin Cart Sorting Test; **WHIIRS**= Women's Health Initiative Insomnia Rating Scale; **WLG=** Word List Generation Test; **WMS-IV**= Visual Reproduction of the Wechsler Memory Scale –IV; **WPAI=** Work Productivity and Activity Impairment Questionnaire; **ZSDS=** Zung Self-Rating Depression Scale.

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