Supplementary Results

eResults 1: Characteristics of the unmatched cohort without and with corticosteroids

	Total	Without corticosteroids	With corticosteroids	P value
	N=1579	N=1044 (66.1%)	N=535 (33.9%)	
Age (years), median (IQR)	86.0 (81-91)	86.4 (81-91)	85.2 (80-90)	<0.001
Female sex	889 (56.3)	636 (60.9)	253 (47.3)	<0.001
Comorbidities				
Dementia	812 (51.4)	595 (57)	217 (40.6)	< 0.001
Missing values	3 (0.2)	2 (0.1)	1 (0.2)	
Depression	424 (26.9)	312 (29.9)	112 (20.9)	< 0.001
Missing values	1 (0.1)	1 (0.1)	0 (0)	
Parkinson disease	67 (4.2)	45 (4.3)	22 (4.1)	0.847
Missing values	2 (0.1)	2 (0.2)	0 (0)	
Hypertension	1083 (68.6)	712 (68.2)	371 (69.3)	0.642
Diabetes	422 (26.8)	258 (24.8)	164 (30.7)	< 0.001
Missing values	4 (0.3)	3 (0.3)	1 (0.2)	
Atrial fibrillation	461 (29.2)	321 (30.7)	140 (26.2)	0.058
Obesity	177 (11.2)	105 (10.1)	72 (13.5)	0.041
Missing values	18 (1.1)	11 (1)	7 (1.3)	
Chronic heart failure	369 (23.4)	236 (22.6)	133 (24.9)	0.316
Stroke	326 (20.6)	223 (21.4)	103 (19.3)	0.327
Myocardial infraction	346 (21.9)	216 (20.7)	130 (24.3)	0.105
Peripheral vascular disease	190 (12)	113 (10.8)	77 (14.4)	0.042
Missing values	4 (0.3)	4 (0.4)	0 (0)	
COPD	218 (13.8)	130 (12.5)	88 (16.4)	0.032
Missing values	4 (0.3)	4 (0.4)	0 (0)	
Peptic ulcer disease	105 (6.6)	78 (7.5)	27 (5)	0.066
Missing values	4 (0.3)	3 (0.3)	1 (0.2)	
Connective tissue disease	17 (1.1)	9 (0.9)	8 (1.5)	0.249
Missing values	1 (0.1)	1 (0.1)	0 (0)	
Liver disease	5 (0.3)	4 (0.4)	1 (0.2)	0.12
Missing values	1 (0.1)	0 (0)	1 (0.2)	

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Hemiplegia	65 (4.1)	50 (4.8)	15 (2.8)	0.061
Missing values	1 (0.1)	0 (0)	1 (0.2)	
Chronic kidney disease	572 (36.2)	386 (37)	186 (34.8)	0.402
Missing values	4 (0.3)	2 (0.2)	2 (0.4)	
Solid tumor	173 (11)	114 (10.9)	59 (11)	0.958
Missing values	5 (0.3)	4 (0.4)	1 (0.2)	
Leukemia/lymphoma	32 (2)	9 (0.9)	23 (4.3)	< 0.001
AIDS	4 (0.3)	3 (0.3)	1 (0.2)	1
Charlson Cormobidity Index, median (IQR)	2.6 (1-4)	2.6 (1-4)	2.8 (1-4)	0.267
Missing values	58 (3.7)	41 (3.9)	17 (3.2)	
Functional autonomy				
ADL, median (IQR)	3.9 (2-6)	3.7 (2-6)	4.3 (3-6)	< 0.001
Missing values	43 (2.7)	32 (3.1)	11 (2.1)	
CFS,				0.01
CFS 1-3, fit	355 (22.5)	195 (18.7)	160 (29.9)	
CFS 4, vulnerable	175 (11.2)	115 (11.0)	60 (11.2)	
CFS 5-9, frail	1017 (64.4)	705 (67.5)	312 (58.3)	
Missing values	32 (2)	29 (2.8)	3 (0.6)	
Living in nursing home	336 (21.3)	266 (25.5)	70 (13.1)	< 0.001
Missing values	4 (0.3)	4 (0.4)	0 (0)	
Polypharmacy (≥5 drugs)	994 (63)	628 (60.2)	366 (68.4)	< 0.001
Missing values	4 (0.3)	3 (0.3)	1 (0.2)	
Symptoms				
Max temperature (°C), median (IQR)	38.1 (37.7-38.9)	38.1 (37.7-38.9)	38.3 (37.8-39.0)	0.002
Missing values	57 (3.6)	42 (4)	15 (2.8)	
Respiratory rate/min, median (IQR)	29.9 (24.0-35.5)	28.1 (24.0-32.0)	33.0 (28.0-40.0)	<0.001
Missing values	176 (11.1)	136 (13)	40 (7.5)	
Oxygen saturation <90%	674 (42.7)	340 (32.6)	334 (62.4)	<0.001
Missing values	4 (0.3)	3 (0.3)	1 (0.2)	
qSOFA at admission				0.006
0	464 (29.4)	303 (29)	161 (30.1)	
1	612 (38.8)	407 (39)	205 (38.3)	
2	205 (13)	113 (10.8)	92 (17.2)	
3	22 (1.4)	10 (1)	12 (2.2)	
Missing values	276 (17.5)	211 (20.2)	65 (12.1)	

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Biology				
Min lymphocytes (G/L), median (IQR)	0.8 (0.4-1.0)	0.9 (0.5-1.1)	0.6 (0.3-0.8)	< 0.001
Missing values	38 (2.4)	31 (3)	7 (1.3)	
C-reactive protein level (mg/L), median (IQR)	123 (51-175)	110 (36-159)	149 (83-199)	< 0.001
Missing values	43 (2.7)	37 (3.5)	6 (1.1)	
Cytolysis	447 (28.3)	244 (23.4)	203 (37.9)	< 0.001
Missing values	105 (6.6)	89 (8.5)	16 (3)	
Cholestasis	386 (24.4)	220 (21.1)	166 (31)	< 0.001
Missing values	107 (6.8)	90 (8.6)	17 (3.2)	
RT-PCR–positive	1507 (95.4)	983 (94.2)	524 (97.9)	0.003
Missing values	15 (0.9)	13 (1.2)	2 (0.4)	
COVID-19 anomalies on chest CT	839 (53.1)	391 (37.5)	448 (83.7)	< 0.001
Missing values	270 (17.1)	258 (24.7)	12 (2.2)	
Length of stay (days), median (IQR)	12.1 (6-.0-	11.3 (6.0-14.0)	13.6 (7.0-18.0)	< 0.001
Missing values	15.0)	3 (0.3)	4 (0.7)	
	7 (0.4)			
Destination at discharge				<0.001
Return home	315 (19.9)	237 (22.7)	78 (14.6)	
Transfer in rehabilitation unit	682 (43.2)	509 (48.8)	173 (32.3)	
Death	465 (29.4)	224 (21.5)	241 (45)	
Other*	112 (7.1)	70 (6.7)	42 (7.9)	

Notes: ADL = activities of daily living; CFS = Clinical Frailty Score; COPD = chronic obstructive pulmonary disease; CT = computed tomography; qSOFA = quick Sequential Organ Failure Assessment

** transfer to other units (intensive care unit, palliative care unit, other medical ward).*

Data are number (%) unless indicated.

Supplementary material

eMethods 1: STROBE Statement—Checklist of items that should be included in reports of cohort studies
eMethods 2: Original statistical analysis plan

eMethods 1: STROBE Statement—Checklist of items that should be included in reports of cohort studies

	Item No	Recommendation
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract → **Page 1,2**
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found → **Page 2**
Introduction		
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported → **Page 3**
Objectives	3	State specific objectives, including any prespecified hypotheses → **Page 4**
Methods		
Study design	4	Present key elements of study design early in the paper → **Page 4**
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection → **Page 4,5**
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up → **Page 4**
		(*b*) For matched studies, give matching criteria and number of exposed and unexposed→ **Page 6,7**
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable → **Page 5**
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group → **Page 5**
Bias	9	Describe any efforts to address potential sources of bias → **Page 6,7**
Study size	10	Explain how the study size was arrived at → **Page 6**
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why → **Page 6**
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding → **Page 6,7**
		(*b*) Describe any methods used to examine subgroups and interactions → **Page 7**

		(*c*) Explain how missing data were addressed → **Page 7**
		(*d*) If applicable, explain how loss to follow-up was addressed
		(*e*) Describe any sensitivity analyses
Results		
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed → **Page 7, Figure 1**
		(b) Give reasons for non-participation at each stage → **Figure 1**
		(c) Consider use of a flow diagram → **Figure 1**
Descriptive data	14*	(a) Give characteristics of study participants(eg demographic, clinical, social) and information on exposures and potential confounders → **Page 7, Table 1, Table 4, eResults 1**
		(b) Indicate number of participants with missing data for each variable of interest → **Page 7, Table 1 – 2, eResults 1**
		(c) Summarise follow-up time (eg, average and total amount) → **Page 7, Table 1 – 2, eResults 1**
Outcome data	15*	Report numbers of outcome events or summary measures over time → **Page 8 , Table 1 – 2– 4, eResults 1**
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included → **Page 8, Table 1 – 3, eResults 1**
		(*b*) Report category boundaries when continuous variables were categorized → **Page 8, Table 3**
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
Discussion		
Key results	18	Summarise key results with reference to study objectives → **Page 9**
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias → **Page 11,12**
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence → **Page 9-11**
Generalisability	21	Discuss the generalisability (external validity) of the study results → **Page 11,12**
Other information		
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based → **Page 13**

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of

Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.

eMethods 2: Original statistical analysis plan

1. Patients:

From March 13 to April 15, 2020, 821 patients with confirmed COVID-19 were enrolled from 13 acute COVID-19 geriatric wards in Paris area were included in the GERICOCO cohort.

From November 2020 to May 2021, all consecutive patients treated with corticoids admitted to one of the participating acute COVID-19 geriatric wards in Paris area will be evaluated for eligibility. Patients without social security or who refused the use of their medical data will be excluded.

COVID-19 will be confirmed by real-time reverse polymerase chain reaction (RT-PCR) for SARS-CoV-2 or computerized tomography (CT) scan, according to World Health Organization (WHO) (2).

2. Outcomes:

- Compare the in-hospital mortality rate of geriatric patients hospitalized for COVID-19, treated or not with corticosteroid.

3. Descriptive and explanatory variables:

Baseline characteristics

- Age
- Sex
- Home or nursing home residence
- Previous medical history of :
    - Dementia
    - Depression
    - Parkinson disease
    - Hypertension
    - Diabetes
    - Atrial fibrillation
    - Obesity (BMI > 30 kg/m^2)
    - Myocardial infraction
    - Chronic heart failure
    - Stroke
    - Peripheral vascular disease
    - Hemiplegia
    - COPD
    - Chronic kidney injuries (Cockroft < 30 mL/min)
    - Connective tissue disease

    - Liver disease
    - Cancer
    - Lymphoma
    - AIDS
- Polypharmacy (use of 5 or more chronic medicines per day)
- Comorbidity severity assessed with the Charlson comorbidity index (4)
- Functional status assessed with the Activities of Daily Living (ADL) scale (6 basic human functions: bathing, dressing, toileting, transfer, continence and feeding; 1 point for each function (5)
- Frailty assessed with the Clinical Frailty Score (CFS) to define patients as fit (1-3), vulnerable (4) and frail (5-9) (6)

<u>COVID-19</u>

- Date of COVID-19 onset
- Date of the initial chest CT scan and its results (specific COVID-19 anomalies: yes or no)
- Date of the initial nasopharyngeal swab tested by RT-PCR and its results.
- Symptoms at onset:
    - Temperature (°C)
    - Blood pressure < 100 mmHg
    - Respiratory rate ≥ 22
    - Oxygen saturation <90%
    - Dyspnea
    - Cough
    - O2 flow (L/min)
    - Confusion
    - Glasgow score < 15 (range from 3-15 with points on eyes responses from 1 to 4, verbal responses from 1 to 5 and motor response from 1 to 6) (7)
    - Quick Sequential Organ Failure Assessment (qSOFA) score (range 0–3, with 1 point each for systolic hypotension [≤100 mm Hg], tachypnea [≥22/min], or altered consciousness [Glasgow coma score < 14]) (8)
- Interval from symptom onset to admission in a geriatric ward
- Complications during hospitalization (with their start date):
    - respiratory rate ≥ 22/min
    - oximetry < 90%
    - dyspnea
    - delirium or altered consciousness (Glasgow coma score < 14)
    - thromboembolic events
    - acute cardiac injury, diagnosed with serum level of troponin above the 99th percentile upper reference limit or new abnormalities observed on electrocardiography and echocardiography routinely performed.
    - acute atrial fibrillation

    - stroke
    - acute kidney injury (AKI), identified according to the Kidney Disease Improving Global Outcomes (KDIGO) definition. (9)
    - stool impaction
    - admission to an ICU
    - palliative decision
- Routine blood tests
    - complete blood count
    - renal and liver function
    - C-reactive protein level
- Specific treatments (with their start date)
    - antiviral therapy
    - corticosteroid therapy
    - hydroxychloroquine
    - anticytokine or immunomodulatory agents
- Corticosteroid therapy:
    - Type of corticoid
    - Dosage equivalent in dexamethasone (mg/L)
    - Treatment duration
- Nonspecific treatments
    - respiratory support
    - hydration
    - blood transfusion
    - antibiotic therapy
    - proton pump inhibitor
    - prophylactic anticoagulation
    - midazolam and morphine therapies
- Corticotherapy side effects and their dates
    - Gastro-intestinal hemorrhage
    - Decompensated diabetes
    - Acute hypertension (> 180/100 mmhg)
    - Delirium
    - Behavioral disorder
    - Secondary infections
    - Glucocorticoid disruption
- The status (alive or dead) and the destination at discharge (home, including nursing home; rehabilitation center; or other, including palliative care center) were also recorded.
- Interval from symptom onset to death
- Length of hospital stay

4. Statistical analysis

The statistical plan of the study was established before the statistical analysis. In order to demonstrate a reduction of 6% of the in-hospital mortality with the use of corticosteroids, we estimated that 690 subjects per group were needed (power 80%, alpha risk 0.05) based on our deceased rate of 31% on our first cohort.

Quantitative variables will be described by their median (IQR) and number of missing data. Normality will be assessed by graphical representation of their distribution. Qualitative variables will be described by frequency, percentage and number of missing data.

Patient characteristics will be described overall and according to treatment status on a supplementary material.

In-hospital mortality rate will be compared between patients with and without corticosteroids using the propensity score (PS) framework (11,12). We will create a new dataset in which the probability to receive corticosteroids or not is equally balanced among patients' baseline characteristics (age, sex, Charlson comorbidity index, depression, Parkinson disease, obesity, polypharmacy, CFS, ADL score, institutionalization). Patients with or without corticosteroids will be matched using a 1:1 nearest neighbor matching algorithm without replacement, with a caliper of 0.1 of the standard deviation of the PS on the logit scale. Covariate balance between the two groups was assessed after matching, and we considered an absolute standardized difference less than 0.1 as evidence of balance.

Univariate comparison between treated and non-treated patients will be performed, using Student's t-test or Wilcoxon's, Chi square test, or Fisher's exact test, as appropriate.

A logistic mixed model will be performed with a center effect as a random effect to assess independent variables associated with in-hospital mortality, and adjusted Odds Ratio (ORs) with their 95% confidence intervals will be calculated. Variables included in the models will be all variables with $p < 0.10$ on univariate analysis (stepwise selection). Variables excluded during the stepwise process which are found significantly associated to the outcome will be forced in to model. Multicollinearity bias will be checked using the variance inflation factor.

We will assess for missing values and their distribution in the 2 cohorts and prepare a specific strategy according to the results.

All tests will be 2-sided, and $P < 0.05$ will be considered statistically significant.

All statistical analysis will be performed using R (R v4.0.0.) software.

5. Bibliogragphy

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