CLINICAL STUDY

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Risk factors for mortality in hemodialysis patients with COVID-19: a systematic review and meta-analysis

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ABSTRACT

Background: New evidence from studies on risk factors for mortality in hemodialysis (HD) patients with COVID-19 became available. We aimed to review the clinical risk factors for fatal outcomes in these patients.

Methods: We performed meta-analysis using the PubMed, EMBASE, and Cochrane databases. A fixed- or random-effects model was used for calculating heterogeneity. We used contourenhanced funnel plot and Egger's tests to assess potential publication bias.

Results: Twenty-one studies were included. The proportion of males was lower in the survivor group than in the non-survivor group (OR = 0.75, 95% CI [0.61, 0.94]). The proportion of respiratory diseases was significantly lower in the survivor group than in the non-survivor group (OR = 0.42, 95% CI [0.29, 0.60]). The proportion of patients with fever, cough, and dyspnea was significantly lower in the survivor group (fever: OR = 0.53, 95% CI [0.31, 0.92]; cough: OR = 0.50, 95% CI [0.38, 0.65]; dyspnea: OR = 0.25, 95% CI [0.14, 0.47]) than in the non-survivor group. Compared with the non-survivor group, the survivor group had higher albumin and platelet levels and lower leucocyte counts.

Conclusions: Male patients might have a higher risk of developing severe COVID-19. Comorbidities, such as respiratory diseases could also greatly influence the clinical prognosis of COVID-19. Clinical features, such as fever, dyspnea, cough, and abnormal platelet, leucocyte, and albumin levels, could imply eventual death. Our findings will help clinicians identify markers for the detection of high mortality risk in HD patients at an early stage of COVID-19.

Abbreviations: HD: hemodialysis; COVID-19: coronavirus disease 2019; SARS-CoV-2: severe acute respiratory syndrome coronavirus 2; ESRD: end-stage renal disease; QUIP S: Quality In Prognosis Studies; CI: confidence intervals; WMD: weighted mean difference

Introduction

Coronavirus disease 2019 (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has rapidly spread worldwide and has become a global pandemic. As of 19 February 2021, there have been more than 100 million confirmed cases and over 2 million deaths. The common symptoms of COVID-19 include fever, cough, dyspnea, and diarrhea [1]. According to published data, the spectrum of disease is highly variable and can be asymptomatic or progress to

fatal multiorgan failure [2]. To date, the mechanisms underlying these differences in disease presentation are not well understood. Multiple international investigators have revealed that patients who are older or have comorbidities, such as diabetes, hypertension, obesity, cardiovascular diseases, and chronic lung disease were not only more susceptible to COVID-19 but also tended to have a higher risk of death due to COVID-19 [3,4]. However, these findings were mainly obtained from studies conducted in the general population. The

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Supplemental data for this article can be accessed <u>here</u>.

Patients on maintenance HD with end-stage renal disease (ESRD) are particularly vulnerable to SARS-CoV-2 infection and have a high mortality rate [5]. First, HD patients with significant comorbidities, such as diabetes, hypertension, and cardiovascular disease and older age, place them at higher risk of developing severe illness. Second, HD patients have abnormal immune system responses due to the uremic state [6], which results in both impaired responses and a proinflammatory state. Because of their immunocompromised status, the clinical presentation could be different from that of the general population, which may increase the difficulty of diagnosis and treatment of HD patients. Third, due to the nature of their illness, HD patients must travel from home to the hospital routinely and interact with doctors, nurses, medical workers, and other patients in a shared space for at least 12 h weekly, which may lead to widespread crosscontamination.

Previous data revealed that the estimated mortality rate related to maintenance dialysis in patients with COVID-19 ranged between 6.5 and 52% [5,7–11], which is much higher than that in the general population. To effectively predict the progression of the disease and improve protective and preventive strategies, it is crucial to identify the risk factors for mortality in patients with COVID-19 on maintenance HD. Therefore, we aimed to perform a systematic review and metaanalysis of the clinical presentation, disease course, laboratory, outcomes, and risk factors of survivors and non-survivors among HD COVID-19 patients to help clinical physicians make better decisions.

Materials and methods

Search strategy

We follow the Preferred Reporting Items for Systematic Reviews and Meta-Analyses statement to perform the meta-analysis [12]. An electronic search of the PubMed, EMBASE, and Cochrane Library databases was conducted from 1 December 2019 to 29 August 2021, with no language restrictions. OAlster and OpenGrey were searched for gray literature. The following keywords and/or medical subject heading terms were used: ('novel coronavirus' or '2019-nCoV' or 'coronavirus disease 2019' or 'SARS-CoV-2' or 'COVID-19') AND (HD OR renal insufficiency OR ESRD OR renal replacement therapy OR dialysis OR HD OR chronic kidney disease (CKD) OR chronic kidney failure OR CKD-G5D OR end-stage kidney disease). Details of the search strategy for each database are provided in Supplementary Material 1. A manual search of possible articles relevant to this topic was conducted. We also communicated with the corresponding authors of the included studies for additional data on items needed in our study to accurately calculate the outcome measures.

Study selection

Two independent investigators (GA and FW) initially screened the titles and abstracts. Full-length articles from the identified studies were retrieved. The inclusion criteria in our meta-analysis were as follows: (1) HD patients with confirmed COVID-19; (2) reported demographics, comorbidities, clinical manifestations, laboratory values, and outcomes of survivors and nonsurvivors; and (3) risk factors for mortality. Studies were excluded if they were (1) case reports, conference abstracts, editorials, non-clinical studies, and reviews or (2) duplicated publications.

Data extraction and quality assessment

Two investigators (GA and FW) independently extracted data from the studies that fulfilled our inclusion criteria. Discrepancies were resolved by discussion at group conferences. The extracted data were as follows: name of the first author, study period, study design, region, number of participants, outcomes, HD access, and ESRD vintage. The endpoint was all-cause mortality. The quality of studies was assessed using the Newcastle-Ottawa Scale (NOS) by two independent investigators (YW and QX) [13]. Studies that achieved seven or more, four to six, and fewer than four stars on NOS were considered to be of high, medium, and poor quality, respectively [14]. In addition, we used the Quality In Prognosis Studies (QUIPS) tool for the assessment of the risk of bias [15]. The maximum score was nine stars, and scores greater than six were considered to indicate high quality.

Statistical analysis

The collected data from the included studies were analyzed using RevMan version 5.3 (The Nordic Cochrane Centre for The Cochrane Collaboration, Copenhagen, Denmark) and Stata software 15.1 (StataCorp LLC, College Station, TX). Reported odds ratios (ORs) and 95% confidence intervals (CIs) were extracted from the included studies. ORs with 95% CIs were used as summary estimates for dichotomous outcomes. In addition, continuous variables were compared by calculating the weighted mean difference (WMD) or standardized mean difference, when applicable. Heterogeneity among studies was evaluated using Cochran's Q test and l^2 statistic. l^2 statistics were used to assess the magnitude of heterogeneity wherein 25%, 50%, and 75% represented low, moderate, and high degrees of heterogeneity, respectively. The fixed-effect model (Mantel-Haenszel) was used to calculate pooled estimates among studies if l^2 was \leq 50%. If l^2 was >50%, the random-effects model (DerSimonian and Laird) was preferred [16,17]. A random-effect model was also applied for the meta-analyses that were analyzed in a fixed-effect model in order to verify our results. Sensitivity or subgroup analyses were conducted to assess the heterogeneity. Sensitivity analysis was performed to investigate the stability of the outcome and was performed by sequentially excluding one study at a time. If there were more than 10 studies, publication bias would be assessed [17]. To visually inspect asymmetry due to publication bias, funnel plots and contour-enhanced funnel plots were constructed. Additionally, Begg's and Egger's tests were conducted for the quantitative analysis of publication bias, where p < .05 was statistically significant. Statistical significance

(*p*) was set at <.05. This study was registered with PROSPERO (number CRD42021241582).

Results

Identification of relevant studies

Through a literature search, a total of 3171 potentially eligible studies were identified based on predefined selection criteria. After removal of duplicates, a review of the titles and abstracts of 1839 articles was performed, and 1755 studies were further excluded after screening the titles and abstracts. A total of 84 articles were obtained and read in full. Of these, 63 studies were excluded for reasons detailed in Figure 1. Ultimately, 21 studies [18–38], comprising 2898 HD patients with COVID-19, were included in this meta-analysis. The process of study retrieval is summarized in Figure 1.

Study characteristics and quality assessment

Demographic data of the patients in the included trials are presented in Table 1. Among the 21 included



Figure 1. Flow diagram of literature search and study selection.

Table 1. Baseline characteristics of included studies.

Hemodialysis access

					ESRD vinta	ge, years ^a	Surviva	اه	Death	
Author	Country	Research type	Period	Number of patients	Survival	Death	Arteriovenous fistula	Central venous catheter	Arteriovenous fistula	Central venous catheter
Stefan et al. [18]	Romania	Observational retrospective cohort	24 March-22 May 2020	37	2.9 (0.4-5.8)	3.6 (1.8–4.8)	18 (60)	12 (40)	2 (29)	5 (71)
Creput et al. [19]	France	Observational retrospective cohort	13 March–15 April 2020	38	3.2 (0.1–14.2)	4.3 (0.5–17.3)	NR	NR	NR	NR
Zou et al. [20]	China	Observational retrospective cohort	1 January–25 March 2020	66	5.0 (3.2, 6.0)	4.5 (2.2, 7.0)	44 (91.6)	4 (8.4)	16 (88.9)	2 (11.1)
Goicoechea et al. [21]	Spain	Observational retrospective cohort	12 March-10 April 2020	36	NR	NR	NR	NR	NR	NR
Deshpande et al. [22]	India	Observational retrospective cohort	1 March-25 May 2020	75	NR	NR	NR	NR	NR	NR
Bahat et al. [23]	Turkey	Observational retrospective cohort	11 March-12 May 2020	25	NR	NR	NR	NR	NR	NR
Mazzoleni et al. [24]	Belgium	Retrospective cross-sectional cohort	6 March–4 April 2020	40	NR	NR	NR	NR	NR	NR
Seidel et al. [25]	Germany	Observational retrospective cohort	February–April 2020	56	NR	NR	NR	NR	NR	NR
Min et al. [26]	China	Observational retrospective cohort	Until 28 February 2020	74	5.6 (3-7.1)	4.3 (2.4–4.9)	43 (71.0)	17 (29.0)	9 (61.5)	5 (38.5)
Sipahi et al. [27]	Turkey	Observational retrospective cohort	3 March–23 April 2020	23	NR	NR	NR	NR	NR	NR
Shang et al. [28]	China	Observational retrospective cohort	3 February–4 April 2020	47	NR	NR	NR	NR	NR	NR
Hendra et al. [29]	UK	Observational retrospective cohort	15 April–26 May 2020	148	NR	NR	NR	NR	NR	NR
Sosa et al. [30]	Guatemala	Observational retrospective cohort	1 May–31 July 2020	319	NR	NR	NR	NR	NR	NR
Islam et al. [31]	Turkey	Observational retrospective cohort	NR	34	4.7 ± 3.6	9 ± 7.5	NR	NR	NR	NR
Lugon et al. [32]	Brazil	Observational retrospective cohort	February–December 2020	741	NR	NR	469 (77.9)	133 (22.1)	86 (61.9)	53 (38.1)
Turgutalp et al. [33]	Turkey	Observational retrospective cohort	17 April–1 June 2020	567	NR	NR	NR	NR	NR	NR
Ahmed et al. [34]	United Arab Emirates	Observational retrospective cohort	1 March-1 July 2020	152	NR	NR	NR	NR	NR	NR
Can et al. [35]	Turkey	Observational retrospective cohort	1 January–30 December 2020	35	NR	NR	NR	NR	NR	NR
Medjeral-Thomas	UK	Observational retrospective cohort	March–May 2020	106	NR	NR	NR	NR	NR	NR
Prasad et al. [37]	India	Observational prospective cohort	15 March-31 July 2020	263	NR	NR	162 (71.1)	66 (28.9)	16 (45.7)	19 (54.3)
Quiroga et al. [38]	Spain	Observational prospective cohort	15 March–28 April 2020	16	NR	NR	6 (50)	6 (50)	2 (50)	2 (50)
^a Data procented as mer	dian (IOD) or mean (SD). N.D. not reported								

^aData presented as median (IQR) or mean (SD); NR: not reported

studies.
of included
aracteristics o
Patient ch
Table 2.

											Ū	Cardiovascula	ar disease			Respirator	y disease	
	Agı	e a	Male	(%)	Diabe	ites	Hyperte	nsion	Cance	-	Coronary hea	art disease	Ischemic ca	rdiopathy	CO	Q	Chronic lung	l disease
Author	Survival	Death	Survival	Death	Survival	Death	Survival	Death	Survival	Death	Survival	Death	Survival	Death	Survival	Death	Survival	Death
Stefan et al.	63 (55–68)	69 (55–72)	16 (53)	3 (43)	11 (37)	2 (29)	25 (83)	5 (71)	1 (3)	1 (14)	13 (43)	6 (86)	NR	NR	1 (3)	2 (29)	NR	NR
Creput et al.	65 (31–89)	74 (63–85)	22 (73)	8 (100)	15 (50)	2 (25)	29 (97)	7 (88)	NR	NR	NR	NR	12 (40)	5 (63)	NR	NR	NR	NR
Zou et al.	65.5	60	20 (41.7)	11 (61.1)	NR	NR	NR	NR	2 (4.2) 2	(11.1)	10 (20.8)	10 (55.6)	NR	NR	7 (14.6)	3 (16.7)	NR	NR
	(57.0, 70.5)	(52.0, 73.0)																
Goicoechea et al.	69 ± 14	75±6	17 (68)	6 (54)	17 (68)	6 (54)	25 (100)	10 (91)	NR	NR	7 (28)	1 (9)	NR	NR	6 (24)	1 (9)	NR	NR
Deshpande et al.	53.35 ± 12.56	60 ± 11.8	37 (56.1)	6 (66.7)	32 (48.5)	7 (77.8)	49 (74.2)	6 (66.7)	NR	NR	18 (27.3)	4 (44.4)	NR	NR	1 (1.5)	3 (33.3)	NR	NR
Bahat et al.	60.8 ± 14.5	59.4 ± 21.1	9 (36)	1 (20)	15 (75)	3 (60)	15 (75)	4 (80)	NR	NR	7 (35)	2 (40)	NR	NR	1 (5)	0 (0)	NR	NR
Mazzoleni et al.	71 (63–79)	78 (73–82)	14 (48.3)	9 (81.8)	19 (65.5)	7 (63.6)	26 (89.3)	11 (100)	2 (6.9) 1	I (9.1)	NR	NR	NR	NR	NR	NR	9 (31.0)	7 (63.6)
Seidel et al.	NR	NR	NR	NR	18 (43.9)	7 (46.7)	34 (82.9)	9 (60.0)	NR	NR	16 (39.0)	5 (33.3)	NR	NR	NR	NR	NR	NR
Min et al.	63.00	63.00	25 (41.9)	9 (61.5)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	(57.00-72.00)	(59.50-72.00)																
Sipahi et al.	NR	NR	NR	NR	8(40)	3 (100)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Shang et al.	57.2 ± 15.0	70.6 ± 11.8	23 (60.5%)	7 (77.8%)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Hendra et al.	61.70 ± 14.6	71.69±11.9	60 (53.6)	24 (66.7)	58 (51.8)	20 (55.6)	91 (81.3)	31 (86.1)	NR	NR	NR	NR	25 (22.3)	18 (50)	NR	NR	11 (9.8)	8 (22.2)
Sosa et al.	NR	NR	NR	NR	68 (29.7)	58 (64.4)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Islam et al.	59.8 ± 13.2	72.8 ± 6.6	12 (42.9)	3 (50)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Lugon et al.	55 ± 16	64 ± 15	364 (60.9)	88 (63.3)	216 (35.9)	77 (55.4)	498 (82.7)	121 (87.1)	21 (3.5) (5 (4.3)	NR	NR	31 (5.1)	10 (7.2)	17 (2.8)	10 (7.2)	NR	NR
Turgutalp et al.	63 (52–71)	66 (57–74)	242 (51.1)	54 (58.1)	218 (46.4)	43 (47.3)	374 (79.1)	70 (79.5)	24 (5.3) (5 (6.5)	NR	NR	180 (42.0)	42 (49.4)	56 (12.7)	21 (23.6)	NR	NR
Ahmed et al.	51.2 ± 11.3	64.1 ± 3.5	112 (81)	11 (79)	75 (54)	3 (21)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Can et al.	NR	NR	9 (37.50)	6 (54.54)	11 (45.83)	8 (72.72)	NR	NR	NR	NR	11 (45.83)	5 (45.45)	NR	NR	NR	NR	NR	NR
Medjeral-Thomas	65 (53–72)	76 (61–80)	59 (66)	7 (44)	48 (53)	9 (56)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
et al.																		
Prasad et al.	50.95 ± 13.45	57.00 ± 13.84	146 (64.0)	27 (77.1)	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Quiroga et al.	69 ± 17	79±4	9 (75)	4 (100)	4 (33)	3 (75)	11 (92)	2 (50)	NR	NR	2 (17)	0	NR	NR	1 (8)	2 (50)	NR	NR
^a Age data presen	ted as median	(IQR) or mea	IN (SD); COI	PD: chronic	obstructiv	e pulmonā	rry disease;	NR: not re	ported									

		Select	ion				Outcome		
study	Representativeness of exposed cohort	Selection of non-exposed cohort	Ascertainment of exposure	Outcome of interest absent at start of study	Comparability	Assessment of outcome	Follow-up long enough for outcomes to occur	Adequacy of follow-up	Tota
	*	*	*	*	**	*			r
stefan et al.	÷	÷	÷	÷	*	÷	:	:	-
Creput et al.	*	*	*	*	*	*	:	:	2
Zou et al.	*	*	*	*	*	*	:	*	∞
Goicoechea et al.	*	*	*	*	* *	*	:	:	7
Deshpande et al.	*	*	*	*	* *	*	:	*	∞
3ahat et al.	*	*	*	*	* *	*	:	:	7
Mazzoleni et al.	*	*	*	*	* *	*	:	*	∞
seidel et al.	*	*	*	*	* *	*	:	:	7
Min et al.	*	*	*	*	* *	*	:	*	∞
sipahi et al.	*	*	*	*	* *	*	:	*	∞
shang et al.	*	*	*	*	* *	*	:	*	∞
Hendra et al.	*	*	*	*	* *	*	:	*	∞
sosa et al.	*	*	*	*	* *	*	:	*	∞
slam et al.	*	*	*	*	* *	*	:	*	∞
-ugon et al.	*	*	*	*	*	*	:	*	∞
Furgutalp et al.	*	*	*	*	*	*	:	:	7
Ahmed et al.	*	*	*	*	*	*	:	:	~
Can et al.	*	*	*	*	*	*	:	:	7
Medjeral-Thomas et al.	*	*	*	*	*	*	:	*	∞
Prasad et al.	*	*	*	*	*	*	:	:	7
Quiroga et al.	*	*	*	*	*	*	:	*	8

Table 3. Study quality assessment using the Newcastle-Ottawa Scale.

studies, two studies were prospective in design, while the others were retrospective. Studies sample sizes ranged from 16 to 741 HD patients with COVID-19. The HD vintage of the patients with ESRD was variable, and the type of angioaccess mostly included arteriovenous fistula and central venous catheter. Table 2 shows the characteristics of the survivor and non-survivor groups, including pre-specified risk factors. The clinical outcome was all-cause mortality, and the overall mortality rate was 19.12%. The details of quality assessment using the NOS tool are presented in Table 3. The quality of the included studies was high, with scores ranging from 7 to 8; the average NOS score was 7.6. According to the QUIPS, for the estimation of quality in the included studies, the evaluation results of each item with potential bias are shown as 'yes', 'partly', 'no', or 'unsure' in Table 4.

Demographical characteristics

The demographic characteristics of the included studies are shown in Figure 2. The results from the 18 included studies (with a total of 2500 patients) showed that the proportion of males was significantly lower in the survivor group than in the non-survivor group (OR = 0.75, 95% CI [0.61, 0.94], p = .01, $l^2 = 0$ %). A random-effects model yielded similar results (Supplemental Figure 1).

The mean age of the patients was 51–71 years in the survivor group across the enrolled studies and 57–79 years in the non-survivor group. Meta-analysis showed that the survivor group was significantly younger than the non-survivor group (WMD = -7.48, 95% CI [-9.99, -4.97], p < .00001, $l^2 = 53\%$).

Five studies showed that kidney failure caused by diabetes or hypertension had no significant difference between the mortality and survivor groups (diabetes: OR = 1.09, 95% CI [0.57, 2.06], p = .80, $l^2 = 0\%$; hypertension: OR = 0.85, 95% CI [0.45, 1.63], p = .63, $l^2 = 27\%$). However, these five studies indicated that the incidence of kidney failure caused by glomerulonephritis was significantly higher in the survivor group than in the non-survivor group (OR = 2.96, 95% CI [1.26, 6.97], p = .01, $l^2 = 0\%$). The random-effects model did not alter the overall estimates and yielded results similar to those of the fixed-effect model (Supplemental Figure 1).

Comorbidities

The comorbidities of the patients in the included studies are shown in Figure 3. The difference in the prevalence of comorbidities was compared between the

Table 4. Qualit	y assessment o	of included st	tudies based	on the	Quality In	Prognosis	Studies (Q	UIPS)
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Quality evaluation of prognosis study

Study	Study participation	Study attrition	Prognostic factor measurement	Outcome measurement	Study confounding	Statistical analysis and reporting
Stefan et al.	Yes	Yes	Yes	Yes	Partly	Yes
Creput et al.	Yes	Yes	Yes	Yes	Partly	
Zou et al.	Yes	Yes	Yes	Yes	Partly	
Goicoechea et al.	Yes	Yes	Yes	Yes	Partly	
Deshpande et al.	Yes	Yes	Yes	Partly	Partly	
Bahat et al.	Yes	Yes	Yes	Yes	Partly	
Mazzoleni et al.	Yes	Yes	Yes	Yes	Partly	
Seidel et al.	Yes	Yes	Yes	Partly	Partly	
Min et al.	Yes	Yes	Yes	Partly	Partly	
Sipahi et al.	Yes	Yes	Partly	Partly	Partly	
Shang et al.	Yes	Yes	Partly	Partly	Partly	
Hendra et al.	Yes	Yes	Yes	Yes	Partly	
Sosa et al.	Yes	Yes	Yes	Partly	Partly	
Islam et al.	Yes	Yes	Partly	Partly	Partly	
Lugon et al.	Yes	Yes	Yes	Partly	Partly	
Turgutalp et al.	Yes	Yes	Yes	Yes	Partly	
Ahmed et al.	Yes	Yes	Yes	Partly	Partly	
Can et al.	Yes	Yes	Partly	Partly	Partly	
Medjeral-Thomas et al.	Yes	Yes	Yes	Yes	Partly	
Prasad et al.	Yes	Yes	Partly	Partly	Partly	
Quiroga et al.	Yes	Yes	Yes	Yes	Partly	

survivor and non-survivor groups. The proportion of cardiovascular and respiratory diseases was significantly lower in the survivor group than in the non-survivor group (cardiovascular disease: OR = 0.73, 95% CI [0.57, 0.93], p = .01, $l^2 = 42\%$; respiratory disease: OR = 0.42, 95% CI [0.29, 0.60], $p \leq .00001$, $l^2 = 24\%$). The randomeffects model yielded non-significant results for cardiovascular disease but similar results for respiratory disease (Supplemental Figure 1). In addition, meta-analysis showed that the proportion of hypertension, diabetes, and cancer was not significantly different between the survivor and non-survivor groups (hypertension: OR = 1.06, 95% CI [0.78, 1.44], p = .72, l² = 15%; diabetes: OR = 0.76, 95% CI [0.49, 1.17], p = .21, $l^2 = 65\%$; cancer: OR = 0.74, 95% CI [0.41, 1.35], p = .33, $l^2 = 0$ %). The random-effects model vielded results similar (Supplemental Figure 1).

Clinical manifestations

The results of the meta-analysis are presented in Figure 4. Regarding fever, cough, and dyspnea, the proportions were significantly lower in the survivor group (fever: OR = 0.53, 95% CI [0.31, 0.92], p = .02, $l^2 = 60\%$; cough: OR = 0.50, 95% CI [0.38, 0.65], p < .0001, $l^2 = 0\%$; dyspnea: OR = 0.25, 95% CI [0.14, 0.47], p < .0001, $l^2 = 61\%$) than in the non-survivor group. Regarding diarrhea, the proportions were not significantly different between the non-survivor and survivor groups (diarrhea: OR = 0.74, 95% CI [0.49, 1.10], p = .14, $l^2 = 2\%$). The random-effects model yielded significant

results for both cough and diarrhea (Supplemental Figure 1).

Laboratory examination

As shown in Figure 5, compared with the non-survivor group, the survivor group had higher albumin levels (WMD = 3.82, 95% CI [1.98, 5.66], p < .0001, $l^2 = 55\%$), lower leucocyte counts (WMD = -1.45, 95% CI [-2.16, -0.75], p < .0001, $l^2 = 50\%$) and higher platelet counts (WMD = 16.06, 95% CI [0.86, 31.26], p = .04, $l^2 = 0\%$). Hemoglobin level and platelet count showed no significant difference between the survivor and non-survivor groups (hemoglobin: WMD = -0.18, 95% CI [-4.72, 2.56], p = .56, $l^2 = 38\%$). The random-effects model yielded similar results (Supplemental Figure 1).

Sensitivity analysis/subgroup analysis and publication bias

Sensitivity analysis was done by excluding one study at a time; subgroup analysis based on countries (European *versus* Asian countries) and sample size (>100 *versus* < 100 patients) did not significantly alter the overall estimates nor reduce the heterogeneity. A funnel plot and contour-enhanced funnel plot representing risk factors, such as sex, age, fever, cough, diarrhea, cardiovascular diseases, diabetes, and hypertension, were compared between the survivor and non-survivor groups. The results were used to evaluate publication bias in this meta-analysis. Based on visual inspection of the funnel plot and contour-enhanced funnel plots



Male							
Study or Subgroup	Surviv	or Total	Death	Total	Weight	Odds Ratio	Odds Ratio
Abmod	LVERUS	100	LVents	10181	1 0%	1 17 10 24 4 54	
Anmed	112	138	11	14	1.9%	1.17 [0.31, 4.51]	
Janat	9	20	1	5	0.5%	3.27 [0.31, 34.72]	
Creput	9	24	0	0	2.0%	0.50 [0.12, 2.12]	•
Sreput	22	30	8	8	1.9%	0.16 [0.01, 3.00]	
Jesnpande	37	66	6	9	2.4%	0.64 [0.15, 2.77]	
Joicoecnea	17	25	6	11	1.4%	1.77 [0.41, 7.58]	
lem	10	112	24	30	0.0%	0.56 [0.26, 1.27]	
siam	21	20		120	1.470	0.75 [0.13, 4.39]	_
Lugon	364	602	88	139	29.0%	0.89 [0.61, 1.30]	
Mazzoleni	14	29	9	11	3.5%	0.21 [0.04, 1.13]	
Medjeral-Thomas	59	90	7	16	2.1%	2.45 [0.83, 7.20]	
/lin	25	60	9	14	4.4%	0.40 [0.12, 1.33]	
Prasad	146	228	27	35	8.6%	0.53 [0.23, 1.21]	
Quiroga	9	12	4	4	0.9%	0.30 [0.01, 7.17]	
Shang	23	38	7	9	2.3%	0.44 [0.08, 2.40]	
Stefan	16	30	3	7	1.2%	1.52 [0.29, 8.01]	
urgutalp	242	474	54	93	22.6%	0.75 [0.48, 1.18]	
lou	20	48	11	18	4.8%	0.45 [0.15, 1.38]	
							•
otal (95% CI)	1100	2054	204	446	100.0%	0.75 [0.61, 0.94]	•
otal events	1196 16.60 df =	17 /D	284 = 0.48\: l ²	= 0%			· · · · · ·
est for overall effect:	Z = 2.57 (F	P = 0.0	1)	- 0 /0			0.01 0.1 1 10 10 Favours Survivor Favours Death
Ade							
.90	Survivo	or	Deat	h		Mean Difference	Mean Difference
tudy or Subgroup	Mean SD	Total	Mean SI) Tota	al Weight	IV. Random, 95%	CI IV. Random. 95% CI
hmed	51 11	138	64	4 14	4 13.9%	-13.00 [-15.79, -10.21] •
ahat	61 15	20	59 2	1	5 1.5%	2.00 [-17.55, 21.55	j - -
reput	62 45	30	74 2	0	8 1.3%	-12.00 [-33.25, 9.25	j —-+
eshpande	53 13	66	60 1	2	9 5.8%	-7.00 [-15.44. 1 44	j
oicoechea	69 14	25	75	6 1 [.]	1 7.8%	-6.00 [-12.53. 0.53	i
endra	62 15	112	72 1	2 3	6 10.4%	-10.00 [-14.80, -5.20	-
ugon	55 16	602	64 1	5 13	9 13.9%	-9.00 [-11.80, -6.20	j =
lazzoleni	71 12	29	78	B 1	1 8.0%	-7.00 [-13.44, -0.56	
lin	64 11	60	65 10	D 14	4 8.7%	-1.00 [-6.93, 4.93	i +
rasad	51 13	228	57 14	4 3	5 10.2%	-6.00 [-10.94, -1.06	i
luiroga	69 17	12	79	4 .	4 4.3%	-10.00 [-20.39, 0.39	i
hang	57 15	38	71 13	2 1	9 5.2%	-14.00 [-23.18, -4.82	i
tefan	62 10	30	65 10	6	7 3.3%	-3.00 [-15.38, 9.38	j —
ou	64 10	48	62 1	7 1	8 5.9%	2.00 [-6.35, 10.35	j +-
otal (95% CI)		1438		320	0 100.0%	-7.48 [-9.99, -4.97	1 ♦
eterogeneity: Tau ² = 9	70. OL:2 -						
est for overall effect: Z	:= 5.85 (P <	27.87, c 0.0000	if = 13 (P =)1)	0.009)); I² = 53%		-100 -50 0 50 10 Favours Survivor Favours Death
est for overall effect: Z Kidney failure	Causeo Surviv	27.87, c 0.0000 d by or	ff = 13 (P = 01) diabeto Death	: 0.009) CS); I ² = 53%	Odds Ratio	-100 -50 0 50 11 Favours Survivor Favours Death Odds Ratio
est for overall effect: Z Kidney failure	Causeo Surviv Events	27.87, d 0.0000 d by or Total	if = 13 (P = 01) diabeto Death Events	e 0.009) es 1 <u>Total</u>); I² = 53% Weight	Odds Ratio M-H, Fixed, 95% Cl	-100 -50 0 50 1 Favours Survivor Favours Death Odds Ratio M-H, Fixed, 95% Cl
est for overall effect: Z Kidney failure Study or Subgroup Creput	Causeo Causeo Surviv <u>Events</u>	27.87, d 0.0000 d by or <u>Total</u> 30	ff = 13 (P = 01) diabet Death Events 2	es Total 8); I ² = 53% <u>Weight</u> 11.6%	Odds Ratio <u>M-H. Fixed, 95% CI</u> 1.50 [0.26, 8.82]	-100 +50 1 Favours Survivor Favours Death Odds Ratio M-H, Fixed, 95% Cl
est for overall effect: Z Kidney failure itudy or Subgroup Treput lin	Causeo Causeo Surviv Events 10	27.87, c 0.0000 d by or <u>Total</u> 30 60	if = 13 (P = 01) Death <u>Events</u> 2 5	eS 1 <u>Total</u> 14); I ² = 53% Weight 11.6% 34.4%	Odds Ratio M-H, Fixed, 95% Cl 1.50 [0.26, 8.82] 0.55 [0.16, 1.90]	Odds Ratio
est for overall effect: Z (idney failure <u>itudy or Subgroup</u> reput lin eidel	Causeo Causeo Surviv <u>Events</u> 10 14	27.87, c 0.0000 d by or <u>Total</u> 30 60 41	ff = 13 (P = 01) Death <u>Events</u> 2 5 2	e 0.009) es <u>Total</u> 14 15	Weight 11.6% 34.4% 11.1%	Odds Ratio M-H. Fixed, 95% CI 1.50 [0.26, 8.82] 0.55 [0.16, 1.90] 3.02 [0.59 15.37]	-100 +50 0 50 1 Favours Survivor Favours Death Odds Ratio M-H, Fixed, 95% Cl
est for overall effect: Z (idney failure itudy or Subgroup Greput lin seidel tiefan	Causeo Causeo Surviv <u>Events</u> 10 14 13	27.87, c 0.0000 by or <u>Total</u> 30 60 41 30	if = 13 (P =)1) Death <u>Events</u> 2 5 2 2 2	e 0.009) es <u>Total</u> 8 14 15 7	Weight 11.6% 34.4% 11.1% 12.0%	Odds Ratio M-H, Fixed, 95% CI 1.50 [0.26, 8.82] 0.55 [0.16, 1.90] 3.02 [0.59, 15.37] 1.25 [0.17, 762]	Odds Ratio
est for overall effect: Z Xidney failure tudy or Subgroup reput tin eidel tefan ou	Causeo Causeo Surviv <u>Events</u> 10 14 13 10 11	27.87, c 0.0000 by for Total 30 60 41 30 48	if = 13 (P =)1) Death <u>Events</u> 2 5 2 2 5 2 5 5	e 0.009) es <u>Total</u> 8 14 15 7 18	Weight 11.6% 34.4% 11.1% 12.0% 31.0%	Odds Ratio M-H, Fixed, 95% CI 1.50 [0.26, 8.82] 0.55 [0.16, 1.90] 3.02 [0.59, 15.37] 1.25 [0.21, 7.62] 0.77 [0.23, 2.65]	Odds Ratio
est for overall effect: Z (idney failure itudy or Subgroup reput tin eidel tefan ou	Caused Surviv Events 10 14 13 10	27.87, c 0.0000 d by ror Total 30 60 41 30 48	ff = 13 (P = 11) diabet Death <u>Events</u> 2 5 2 2 5	e 0.009) es <u>Total</u> 14 15 7 18	Weight 11.6% 34.4% 11.1% 12.0% 31.0%	Odds Ratio <u>M-H, Fixed, 95% CI</u> 1.50 [0.26, 8.82] 0.55 [0.16, 1.90] 3.02 [0.59, 15.37] 1.25 [0.21, 7.62] 0.77 [0.23, 2.65]	Odds Ratio
est for overall effect: Z (idney failure itudy or Subgroup Freput tin leidel itefan iou iotal (95% CI)	Causeo Surviv Events 10 14 13 10 11	27.87, c 0.0000 d by ror <u>Total</u> 30 60 41 30 48 209	if = 13 (P = 11) Death Events 2 5 2 2 5 5	e 0.009) eS <u>Total</u> 8 14 15 7 18 62	Weight 11.6% 34.4% 11.1% 12.0% 31.0% 100.0%	Odds Ratio M-H. Fixed, 95% CI 1.50 [0.26, 8.82] 0.55 [0.16, 1.90] 3.02 [0.59, 15.37] 1.25 [0.21, 7.62] 0.77 [0.23, 2.65] 1.09 [0.57, 2.06]	Odds Ratio
est for overall effect: Z Xidney failure tudy or Subgroup breput tin teidel tefan tou total (95% CI) total events	2 = 5.85 (P < Caused Surviv <u>Events</u> 10 14 13 10 11 58	27.87, c 0.0000 0 by or <u>Total</u> 30 60 41 30 48 209	ff = 13 (P = diabeta Death Events 2 5 2 2 5 16	eS <u>Total</u> 14 15 7 18 62	Weight 11.6% 34.4% 11.1% 12.0% 31.0% 100.0%	Odds Ratio M-H. Fixed, 95% CI 1.50 [0.26, 8.82] 0.55 [0.16, 1.90] 3.02 [0.59, 15.37] 1.25 [0.21, 7.62] 0.77 [0.23, 2.65] 1.09 [0.57, 2.06]	Odds Ratio
est for overall effect: Z Xidney failure itudy or Subgroup Preput tin leidel tefan tou total (95% CI) total events leterogeneity: Ch ² = : est for overall effect:	2:= 5.85 (P < CAUSEC Surviv Events 10 14 13 10 11 58 3.12, df = 4 Z = 0.25 (f	27.87, c 0.00000 2 by ror Total 30 41 30 48 209 4 (P = 0 P = 0.8 ^a	ff = 13 (P = diabet Death Events 2 5 2 2 5 16 0.54); ² =	e 0.009) e S <u>Total</u> 8 14 15 7 18 62 0%	Weight 11.6% 34.4% 11.10% 31.0% 100.0%	Odds Ratio M-H. Fixed. 95% CI 1.50 [0.26, 8.82] 0.55 [0.16, 1.90] 3.02 [0.59, 15.37] 1.25 [0.21, 7.62] 0.77 [0.23, 2.65] 1.09 [0.57, 2.06]	Odds Ratio M-H, Fixed, 95% Cl 0.01 0.1 1 10 10
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est for overall effect: Z (idney failure tudy or Subgroup ireput lin eidel tefan ou otal (95% CI) otal events leterogeneity: Ch ² = : est for overall effect: (idney failure	25.05 (P = 2.55	27.87, c 0.0000 d by ror <u>Total</u> 30 41 30 48 209 4 (P = 0 P = 0.80 d by	if = 13 (P = 11) Death Events 2 5 2 2 5 16 0.54); ² =	es <u>Total</u> 8 14 15 7 18 62 0% ensid	Weight 11.6% 34.4% 11.1% 12.0% 31.0% 100.0%	Odds Ratio M-H. Fixed, 95% CI 1.50 [0.26, 8.82] 0.55 [0.16, 1.90] 3.02 [0.59, 15.37] 1.25 [0.21, 7.62] 0.77 [0.23, 2.65] 1.09 [0.57, 2.06]	Odds Ratio M-H, Fixed, 95% Cl
est for overall effect: Z (idney failure tudy or Subgroup ireput tin eidel tefan ou otal (95% CI) otal events leterogeneity: Chi ² = est for overall effect: (idney failure) tudy or Subgroup	28,76,000 = 2,25,000 =	27.87, c 27.87, c 20.0000 d by for Total 30 41 30 48 209 4 (P = 0 P = 0.8 d by l for Total 30 40 40 209 4 (P = 0 209 4 (P = 0 208 4 (P = 0 209 4 (P = 0) 209 4 (P = 0)	if = 13 (P = 11) diabetu Deatt Events 2 5 2 2 5 16 0.54); ² = 1 hypertu Deatt Events	es <u>Total</u> 8 14 15 7 18 62 0% ensid	Weight 11.6% 34.4% 11.1% 12.0% 100.0% DN Weight	Odds Ratio M-H. Fixed, 95% CI 1.50 [0.26, 8.82] 0.55 [0.16, 1.90] 3.02 [0.59, 15.37] 1.25 [0.21, 7.62] 0.77 [0.23, 2.65] 1.09 [0.57, 2.06] Odds Ratio M-H. Fixed 95% CI	Odds Ratio M-H, Fixed, 95% Cl 0.01 0.1 1 10 10 Favours Survivor Favours Death
est for overall effect: Z (idney failure tudy or Subgroup treput telan eldel tefan ou otal (95% CI) otal events leterogeneity: Chi ² = est for overall effect: (idney failure tudy or Subgroup treput	2.10; (n) = 2, = 5.85 (P < Caused Surviv 10 14 13 10 11 58 3.12; df = 4 Z = 0.25 (f Caused Surviv 	$27.87, c_{c}$ c_{c} 0.00000 d by for Total 300 40 41 300 48 209 4 (P = (P = 0.8) d by l by l cor Total 300 43 209 209 209 209 209 209 209 209	ff = 13 (P = 11) diabete Death Events 2 5 2 2 5 16 0.54); I ² = 1 0) hyperte Death Events 3	es <u>Total</u> 8 14 15 7 18 62 0% ensio	Weight 11.6% 34.4% 11.1% 12.0% 31.0% 100.0% DD Weight 19.5% 19.5%	Odds Ratio M-H. Fixed. 95% CI 1.50 [0.26, 8.82] 0.55 [0.16, 1.90] 3.02 [0.59, 15.37] 1.25 [0.21, 7.62] 0.77 [0.23, 2.65] 1.09 [0.57, 2.06] Odds Ratio M-H. Fixed. 95% CI 0.42 [0.98, 2.25]	Odds Ratio M-H, Fixed, 95% Cl Favours Survivor Favours Death
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Figure 2. Forest plots depict the comparison of demographical characteristics in survivor and non-survivor groups.

Cardiovascular disease Survivo Odds Ratio Odde Ratio Odds Ratio <u>M-H, Fixed, 95% Cl</u> 3.51 [1.14, 10.78] 0.81 [0.11, 6.04] M-H, Fixed, 95% Cl Study or Subarou Events Total 100 138 Ahme Bahat Can 20 24 1.4% 11 11 1.02 [0.24, 4.26 Creput Deshpande Goicoechea 12 18 7 3.2% 3.4% 0.40 [0.08, 2.00 30 66 25 112 602 29 12 41 30 474 48 0.47 [0.11, 1.94 0.7% 11 3.89 [0.42, 36.29 3.88 [0.42, 36.29] 0.82 [0.39, 1.76] 0.76 [0.48, 1.20] 0.04 [0.00, 0.75] 2.14 [0.08, 54.22] 1.28 [0.37, 4.44] 0.13 [0.01, 1.19] Hendra 60 100 14 2 16 13 208 10 9.9% 26.3% 5.7% 0.4% 3.0% 3.7% 30.2% 7.7% 21 29 11 0 5 36 139 11 4 15 7 Lugon Mazzole Quiroga Seidel Stefan 48 10 93 18 0 73 [0 47 1 14 0.21 [0.07, 0.67 Total (95% CI) 1651 381 100.0% 0.73 [0.57, 0.93] Total events 578 153 Heterogeneity: Chi² = 22.60, df = 13 (P = 0.05); l² Test for overall effect: Z = 2.50 (P = 0.01) 42% 0.01 100 0.1 Respiratory disease Survivo Odds Ratio Odds Ratio Study or Su M-H. Fixed, 95% Cl M-H. Fixed, 95% CI Evente Total 0.9% 6.4% 1.3% 13.4% Bahat Deshpande Goicoechea 20 66 25 03 5 9 11 36 0.85 [0.03, 23.82] 0.03 [0.00, 0.34] 3.16 (0.33, 30.00 Hendra 11 17 9 1 112 0.38 [0.14, 1.04 139 11 4 7 13.4% 19.4% 8.6% 3.4% 3.9% 38.1% 4.6% Lugon Mazzoleni Quiroga 10 7 2 2 0.37 [0.17, 0.84] 0.26 [0.06, 1.11] 0.09 [0.01, 1.55] 0.09 [0.01, 1.14] 602 29 12 30 474 48 Stefan Turgutalp Zou 2 21 3 93 18 56 7 0.46 [0.26, 0.80] 0.85 [0.20, 3.74] ٠ Total (95% CI) 1418 333 100.0% 0.42 [0.29, 0.60] 110 57 rogeneity: Chi² = 11.85, df = 9 (P = 0.22); l² = 24% Heterogeneity: Chi² = 1 Test for overall effect: Z 0.01 0.1 100 10 = 4.81 (P < 0.00001) Favours Survivor Favours Deat Hypertension Survive Death Odds Ratio Odds Ratio Study or Subgroup M-H. Fixed, 95% CI Events Total Events Total Weight M-H, Fixed, 95% CI Bahat Creput Deshpande Goicoechea Hendra Lugon Mazzoleni M-H, Fixed, 35% C 0.75 [0.07, 8.38] 4.14 [0.23, 74.70] 1.44 [0.32, 6.41] 7.29 [0.27, 193.68] 0.70 [0.24, 2.01] 0.71 [0.42, 1.22] 0.33 [0.02, 6.90] 2.0% 0.5% 3.5% 0.4% 11.3% 43.4% 2.5% 0.3% 20 30 66 25 112 602 29 12 41 30 474 47 15 29 49 25 91 498 26 11 34 25 374 5 8 9 11 36 139 11 4 15 7 93 6 10 31 121 11 2 -Quiroga Seidel Stefan 11.00 (0.65, 187.17 2.9% 1.7% 31.6% 3.24 [0.87, 12.06 2.00 [0.30, 13.38 9 5 70 Turgutalp 1.23 (0.73, 2.07) Total (95% CI) Total events 1 Heterogeneity: Chi² = 11.81 Test for overall effect: Z = 0 1441 338 100.0% 1.06 [0.78, 1.44] 1177 276 10 (P = 0.30); = 15% 81, df = 1 0.36 (P 0.01 10 100 0.1 Favours Survivaor = 0.72 Favours D Diabetes Odds Ratio Odds Ratio Study or S Events Total nts Total We H. Random, 95% C M-H. Random, 95% Cl 14 5 4.37 [1.17, 16.34] 2.00 [0.26, 15.62] Ahmed Bahat 75 15 11 15 32 17 58 216 19 48 4 18 8 68 11 218 138 20 24 30 66 25 112 602 29 90 12 41 20 229 30 474 6.0% 3.4% Bahat Can Creput Deshpande Goicoechea Hendra Lugon Mazzoleni 2:00 [0.26, 15.62] 0.32 [0.07, 1.50] 3:00 [0.52, 17.32] 0.27 [0.05, 1.39] 1.77 [0.41, 7.58] 0.86 [0.40, 1.83] 0.45 [0.31, 0.65] 1.09 [0.26, 4.62] 0.99 [0.20, 2.50] 11 8 9 11 36 139 11 16 5.0% 4.2% 4.6% 5.4% 9.4% 5.4% 7.3% 2.4% 6.7% 1.8% 11.0% 4.1% 11.5% 20 1.09 [0.26, 4.62] 0.89 [0.30, 2.59] 0.17 [0.01, 2.16] 0.89 [0.27, 2.93] 0.10 [0.00, 2.13] 0.23 [0.14, 0.39] 1.45 [0.24, 8.76] 0.99 [0.63, 1.55] Medjeral-Tho Quiroga Seidel Sipahi Sosa 4 15 3 90 7 93 Sosa Stefan Turgutalp 2 43 1942 0.76 [0.49, 1.17] Total (95% CI) 472 100.0% 833 Total events 258 ² = 42.62, df = 15 (F 0.0002); l² = 65% Heterogeneity: Tau² = Test for overall effect: .39; Chi² = 1.24 (F 0.01 . 10 Favours Dent 0.1 ~urs Survivor Far Cancer Death vents Total 6 139 1 11 Odds Ratio I-H, Fixed, 95% CI 0.80 [0.32, 2.02] 0.74 [0.06, 9.09] 0.21 [0.01, 3.79] Odds Ratio M-H, Fixed, 95% Cl Survivor Events Total 21 602 2 29 1 30 Study or Su 40.5% 5.8% 6.7% 139 11 7 Lugon Mazzoleni Stefan Turgutalp Zou 24 474 93 18 41.0% 0.77 [0.31, 1.95 2 48 6.0% 0.74 [0.06, 8.69 Total (95% CI) 1183 100.0% 0.74 [0.41, 1.35] Total events 50 ieity: Chi² = 0.78, df = 4 (P = = 0.94); l² = 0% 0.01 0.1 Favor 100 1 10 Favours Death 0.98 (P

Figure 3. Forest plots depict the comparison of comorbidities in survivor and non-survivor groups.

alone, there asymmetry was not evident in the analysis of cough as a risk factor, representing a possibility of publication bias. This is further supported by the results of the Begg's test (p = .246), although, the results of the Egger's test are statistically significant (p = .025) (Supplemental Material 2). No publication bias was found in other groups.

Discussion

Since the mortality rate in HD patients with COVID-19 was much higher than that in the general population [39–41], the aim of this study was to identify the risk factors for mortality associated with COVID-19 in this population. The results of this meta-analysis showed that males and those of older age might have a higher risk of mortality, and comorbidities, such as cardiovas-cular and respiratory diseases could also worsen the prognosis of COVID-19 in HD patients. Clinical features, such as fever, dyspnea, and cough, may imply a poor prognosis. Laboratory examinations, such as leucocyte and platelet count and serum albumin level, may be potential predictors of mortality in these patients.

COVID-19-related mortality rate ranges from 1.4 to 8% in the general population. A recently published meta-analysis of 29 international studies demonstrated that the overall mortality rate was 22.4%, and fever was the predominant clinical manifestation in HD patients with COVID-19 [42]. However, their study did not further investigate the risk factors for mortality between surviving and non-surviving HD patients. Most HD patients were old and had multiple comorbidities, such as hypertension, diabetes, and cardiovascular disease. Because of the uremic status, HD patients tend to have a weaker immune system with increased susceptibility to infections [43]. In addition, the HD room where the patients had to visit three times weekly was a crowded and enclosed space, which increased the risk of disease transmission.

CKD is an independent risk factor for COVID-19-associated in-hospital mortality in elderly patients, and acute-on-chronic kidney injury increases the odds of inhospital mortality in patients with CKD hospitalized with COVID-19 [44]. A study showed that compared with patients without preexisting CKD, dialysis patients had a higher risk for 28-d in-hospital death, whereas patients with non-dialysis-dependent CKD had an intermediate risk [45]. Our data showed that in HD patients, males tend to have higher mortality than females, which might be associated with lifestyle and underlying diseases. As immunity and organ function declines with age, elderly HD patients are more likely to die. These results are similar to those of previous studies in the general population [46]. Interestingly, we found that HD patients with glomerulonephritis as the primary ESRD have a better prognosis than those with diabetes and hypertension. In addition, a previous study reported that other patients with comorbidities could have increased risk of COVID-19-related mortality [47,48]. Our study also indicated that cardiovascular and respiratory diseases were associated with higher risk of COVID-19-related mortality in HD patients.

Cough

	Survia	or	Death			Odde Patio	Odde Patio
Study or Subgroup	Events	Total	Evente T	Intal	Weight	M-H Fixed 95% CI	M-H Fixed 95% Cl
Ahmed	60	138	12	14	7 8%	0 13 10 03 0 501	
Rahat	8	20	4	5	2.4%	0.17 [0.02, 1.78]	
Creput	18	30	6	8	2.4%	0.50 [0.09, 2.90]	
Goicoechea	10	25	6	11	3.2%	0.56 [0.03, 2.30]	
Mazzoleni	10	29	7	11	4 2%	0.30 [0.07 1.28]	
Medieral-Thomas	42	90	7	16	4.2%	1 13 [0 39 3 28]	
Min	21	60	10	14	6.7%	0.22 [0.06, 0.27]	
Prasad	213	228	34	35	2.5%	0.42 [0.05, 3.26]	
Quiroga	210	12	2	4	1.4%	0 33 [0 03 3 51]	
Sosa	113	229	54	90	25.0%	0.65 [0.40, 1.07]	
Stefan	9	30	4	7	2.9%	0.32 [0.06 1.74]	
Turqutaln	206	474	53	93	31 9%	0.58 [0.37, 0.91]	
Zou	30	48	16	18	5.6%	0.21 [0.04, 1.01]	
Lou	00	40	10	10	0.070	0.21 [0.04, 1.01]	
Total (95% CI)		1413		326	100.0%	0.50 [0.38, 0.65]	•
Total events	743		215				
Heterogeneity: Chi ² = 1	1 30 df =	= 12 (P	= 0 50) · 12 =	= 0%			⊢ I I I
Test for overall effect: 2	7 = 5.12 (P < 0.0	0001)	070			0.01 0.1 1 10 10
	- 0.12(Favours Survivaor Favours Death
Dyspnea							
Byophica							
	Surviv	or	Death			Odds Ratio	Odds Ratio
Study or Subgroup	Events	Total	Events To	otal	weight	м-н. Random, 95% C	M-H. Random. 95% Cl
Ahmed	16	138	8	14	11.6%	0.10 [0.03, 0.32]	
Bahat	11	20	3	5	6.5%	0.81 [0.11, 5.99]	
Creput	5	30	6	8	7.1%	0.07 [0.01, 0.43]	
Medjeral-Thomas	27	70	4	16	11.2%	1.88 [0.55, 6.44]	
Min	8	60	3	14	9.4%	0.56 [0.13, 2.47]	
Prasad	196	228	34	34	3.9%	0.09 [0.01, 1.46]	
Sosa	52	229	40	90	17.7%	0.37 [0.22, 0.62]	
Stefan	8	30	6	7	5.4%	0.06 [0.01, 0.58]	
Turgutalp	229	474	78	93	17.2%	0.18 [0.10, 0.32]	
Zou	4	48	7	18	10.0%	0.14 [0.04, 0.58]	
tion of the second pressure							
Total (95% CI)		1327	2	299	100.0%	0.25 [0.14, 0.47]	•
Total events	556		189				
Heterogeneity: Tau ² = 0).49; Chi ²	= 23.02	, df = 9 (P =	= 0.00	6); l ² = 61	%	0.01 0.1 1 10 10
Test for overall effect: Z	2 = 4.35 (F	> < 0.00	01)				Favours Survivor Favours Death
Fever							
	Surviv	or	Death			Odde Patio	Odds Patio
Study or Subgroup	Evente	Total	Evente Tr	Ista	Woight	M-H Pandom 95% C	M-H Bandom 95% Cl
	Lyonio	Total	Evenus re	2101	Torgin		
Abmod	61	120	12	14	1 00/	0.06 [0.01.0.49]	·
Ahmed	61 10	138	13	14	4.9%	0.06 [0.01, 0.48]	·
Ahmed Bahat Creput	61 10 18	138 20 30	13 3	14 5 8	4.9% 5.1% 2.9%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89]	
Ahmed Bahat Creput	61 10 18	138 20 30	13 3 8	14 5 8	4.9% 5.1% 2.9%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65]	
Ahmed Bahat Creput Goicoechea Hendra	61 10 18 15	138 20 30 25 112	13 3 8 9	14 5 8 11	4.9% 5.1% 2.9% 6.2%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43]	
Ahmed Bahat Creput Goicoechea Hendra	61 10 18 15 60	138 20 30 25 112 29	13 3 9 13	14 5 8 11 36	4.9% 5.1% 2.9% 6.2% 12.1% 7.2%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43]	
Ahmed Bahat Creput Goicoechea Hendra Mazzoleni Madican Thomas	61 10 18 15 60 15	138 20 30 25 112 29	13 3 8 9 13 8	14 5 8 11 36 11	4.9% 5.1% 2.9% 6.2% 12.1% 7.2%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83]	
Ahmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min	61 10 18 15 60 15 72	138 20 30 25 112 29 90	13 3 9 13 8 15	14 5 11 36 11 16	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.27 [0.03, 2.15]	
Ahmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prosad	61 10 18 15 60 15 72 12	138 20 30 25 112 29 90 60 228	13 3 9 13 8 15 1 24	14 5 11 36 11 16 14 35	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.27 [0.03, 2.15] 3.25 [0.39, 27,35]	
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Outeora	61 10 18 15 60 15 72 12 214	138 20 30 25 112 29 90 60 228 12	13 3 8 9 13 8 15 1 34 2	14 5 8 11 36 11 16 14 35	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.9% 4.9%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.27 [0.03, 2.15] 3.25 [0.39, 27.35] 0.45 [0.06, 3.53] 1.00 [0.10, 2.54]	
Ahmed Bahat Creput Goicoechea Hendra Mazzoleni Mazzoleni Min Prasad Quiroga Soca	61 10 18 15 60 15 72 12 214 6 156	138 20 30 25 112 29 90 60 228 12 229	13 3 8 9 13 8 15 1 34 2 69	14 5 8 11 36 11 16 14 35 4 90	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.9% 4.3% 13.6%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.47 [0.09, 1.83] 0.27 [0.03, 2.15] 3.25 [0.39, 27.35] 0.45 [0.06, 3.53] 1.00 [0.10, 9.61] 0.57 1.41	
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan	61 10 18 15 60 15 72 12 214 6 156	138 20 30 25 112 29 90 60 228 12 229 30	13 3 9 13 8 15 1 34 2 69	14 5 8 11 36 11 16 14 35 4 90 7	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.9% 4.3% 13.6% 6.5%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.27 [0.03, 2.15] 3.25 [0.39, 27.35] 0.45 [0.06, 3.53] 1.00 [0.10, 8.61] 0.65 [0.37, 1.14] 0.69 [0.00, 2.64]	
Ahmed Bahat Creput Goicoschea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp	61 10 18 15 60 15 72 12 214 6 156 12 257	138 20 30 25 112 29 90 60 228 12 229 30 474	13 3 9 13 8 15 1 34 2 69 4 50	14 5 8 11 36 11 16 14 35 4 90 7 92	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.9% 4.3% 13.6% 6.5% 14.4%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.47 [0.09, 1.83] 0.27 [0.32, 2.15] 3.25 [0.39, 27.35] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.65 [0.37, 1.14]	
Anmed Bahat Creput Golcoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Suefan Turgutalp Zou	61 10 18 15 60 15 72 214 6 156 156 257 257	138 20 30 25 112 29 90 60 228 12 229 30 474	13 3 8 9 13 8 15 1 34 2 69 4 50 14	14 5 8 11 36 11 16 14 35 4 90 7 93 18	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.9% 4.3% 13.6% 6.5% 14.4% 8.4%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.27 [0.03, 2.15] 3.25 [0.39, 27.35] 1.00 [0.10, 8.63, 3.53] 1.00 [0.10, 8.64] 1.05 [0.37, 1.14] 0.55 [0.09, 2.64] 1.02 [0.65, 1.59] 0.88 [0.09, 2.64]	
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou	61 10 18 15 60 15 212 214 6 156 156 12 257 11	138 20 30 25 112 29 90 60 228 12 229 30 474 48	13 3 9 13 8 15 1 34 2 69 4 50 14	14 5 8 11 36 11 16 14 35 4 90 7 93 18	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.9% 4.3% 13.6% 6.5% 14.4% 8.4%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.94, 4.43] 0.40 [0.03, 1.83] 0.27 [0.03, 2.15] 3.25 [0.39, 27.35] 0.45 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31]	
Anmed Bahat Creput Goicoschea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CD	61 10 18 15 60 15 72 212 214 6 156 12 257 11	138 20 30 25 112 29 90 60 228 12 229 30 474 48	13 3 9 13 8 15 1 34 2 69 4 50 14	14 5 8 11 36 11 16 14 35 4 90 7 93 18	4.9% 5.1% 2.9% 6.2% 12.1% 12.1% 4.8% 4.7% 4.9% 4.3% 13.6% 6.5% 14.4% 8.4%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.27 [0.33, 2.15] 3.25 [0.39, 27.35] 0.45 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92]	
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Sufan Turgutalp Zou Total (95% CI) Total evente	61 10 18 15 60 15 72 12 214 6 156 12 257 11	138 20 30 25 112 29 90 60 228 12 229 30 474 48 1525	13 3 8 9 13 8 15 1 34 2 69 4 50 14 3 243	14 5 8 11 36 11 16 14 35 4 90 7 93 18 862	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.3% 4.3% 13.6% 6.5% 14.4% 8.4%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.27 [0.03, 2.15] 3.25 [0.39, 27.35] 1.00 [0.10, 8.63] 1.00 [0.10, 8.64] 1.05 [0.37, 1.14] 0.55 [0.37, 1.14] 0.50 [0.02, 0.31] 0.53 [0.31, 0.92]	
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogenetiv: Tau ² = c	61 10 18 15 60 15 72 214 6 156 12 257 11 919 950: Chi ²	138 20 30 25 112 29 90 60 228 12 229 30 474 48 1525 = 32 19	13 3 8 9 13 8 15 1 34 2 69 4 50 14 3 243 df = 13 (P	$ \begin{array}{r} 14 \\ 5 \\ 8 \\ 11 \\ 36 \\ 11 \\ 16 \\ 4 \\ 90 \\ 7 \\ 93 \\ 18 \\ 662 \\ = 0 \\ \end{array} $	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.9% 4.3% 13.6% 6.5% 14.4% 100.0% 02): l ² = 6	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.27 [0.03, 2.15] 3.25 [0.39, 27.35] 0.45 [0.06, 3.53] 1.00 [0.10, 9.64] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 1%	
Anmed Bahat Creput Goicoschea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = C Test for overall effect 7	61 10 18 15 60 15 72 214 6 156 12 257 11 919 919 90.50; Chi ² 2,25 /2	$ \begin{array}{r} 138\\20\\30\\25\\112\\29\\90\\60\\228\\12\\229\\30\\474\\48\\1525\\=32.19\\2=0.02\\\end{array} $	13 3 8 9 13 8 15 1 34 2 69 4 50 14 3 243 , df = 13 (P	$ \begin{array}{r} 14 \\ 5 \\ 8 \\ 11 \\ 36 \\ 11 \\ 16 \\ 4 \\ 90 \\ 7 \\ 93 \\ 18 \\ 662 \\ = 0.0 \\ \end{array} $	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.3% 13.6% 6.5% 14.4% 8.4% 100.0% 102); l ² = 6	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.27 [0.03, 2.15] 3.25 [0.39, 27.35] 0.45 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92]	
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = C Test for overall effect: Z	61 10 18 15 60 15 72 214 6 156 12 257 11 919 0.50; Chi ² 2 = 2.25 (F	138 20 30 25 112 29 90 60 228 12 229 30 474 48 1525 = 32.19 2 = 0.02	13 3 8 9 13 8 15 1 34 2 69 4 50 14 3 (F = 13 (P	$ \begin{array}{r} 14 \\ 5 \\ 8 \\ 11 \\ 36 \\ 11 \\ 16 \\ 14 \\ 35 \\ 4 \\ 90 \\ 7 \\ 93 \\ 18 \\ 362 \\ = 0.0 \\ \end{array} $	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.7% 4.9% 4.3% 13.6% 14.4% 8.4% 100.0%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.47 [0.09, 1.83] 1.00 [0.10, 9, 1.83] 1.00 [0.10, 9, 1.83] 1.00 [0.10, 9, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0%	0.01 0.1 1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = C Test for overall effect: Z	61 10 18 15 60 15 72 214 6 156 12 2214 6 156 12 257 11 919 0.50; Chi ² 2 = 2.25 (F	138 20 30 25 112 29 90 60 228 12 229 30 474 48 1525 = 32.19 2 = 0.02	13 3 8 9 13 8 15 1 34 2 69 4 50 14 3 243 , df = 13 (P)	$ \begin{array}{r} 14 \\ 5 \\ 8 \\ 11 \\ 36 \\ 11 \\ 16 \\ 14 \\ 35 \\ 4 \\ 90 \\ 7 \\ 93 \\ 18 \\ 362 \\ = 0.0 \\ \end{array} $	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.8% 4.7% 4.3% 13.6% 6.5% 14.4% 8.4% 100.0% 102.; I ² = 60	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.27 [0.03, 2.15] 3.25 [0.39, 27.35] 0.45 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0%	0.01 0.1 1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = 0 Test for overall effect: 2 Diarrhea	61 10 18 15 60 15 722 214 6 156 12 257 11 919 9.50; Chi ² 2 = 2.25 (F	138 20 30 25 112 29 90 60 228 12 229 30 474 48 1525 = 32.19	13 3 9 13 8 15 1 34 2 69 4 50 14 50 50 14 50 50 14 50 50 50 14 50 50 50 50 50 50 50 50 50 50	$ \begin{array}{r} 14 \\ 5 \\ 8 \\ 11 \\ 36 \\ 11 \\ 16 \\ 14 \\ 35 \\ 4 \\ 90 \\ 7 \\ 93 \\ 18 \\ 862 \\ = 0.0 \\ \end{array} $	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.7% 4.9% 4.7% 4.9% 4.3% 13.6% 6.5% 14.4% 8.4% 100.0% 12 = 6	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.27 [0.03, 2.15] 3.25 [0.39, 27,35] 0.45 [0.06, 3.53] 1.00 [0.10, 9.61] 1.05 [0.37, 1.14] 0.50 [0.92, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0%	0.01 0.1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = C Test for overall effect: Z Diarrhea	61 10 18 15 60 15 72 12 214 6 156 12 257 11 919 .50; Chi ² 2 = 2.25 (F	138 20 30 25 112 29 90 60 228 12 229 30 474 48 1525 = 32.19 2 = 0.02	13 3 8 9 13 8 15 1 34 2 69 4 50 14 32 43 , df = 13 (P) Death	$ \begin{array}{r} 14 \\ 5 \\ 8 \\ 11 \\ 36 \\ 11 \\ 16 \\ 14 \\ 35 \\ 4 \\ 90 \\ 7 \\ 93 \\ 18 \\ 362 \\ = 0.0 \\ \end{array} $	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.3% 13.6% 6.5% 14.4% 100.0%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.47 [0.09, 1.83] 0.45 [0.03, 2.73] 0.45 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.65 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0% Odds Ratio	0.01 0.1 1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = C Test for overall effect: Z Diarrhea Study or Suboroup	61 10 18 15 60 15 72 21 214 6 156 12 257 11 919 9.50; Chi ² 2 = 2.25 (F Surv	138 20 30 25 112 29 90 60 228 12 229 30 474 48 1525 = 32.19 P = 0.02 ivor s Tota	13 3 8 9 13 8 15 1 34 2 69 4 50 14 3 243 , df = 13 (P) Death I Events	14 5 8 11 36 11 16 14 35 4 90 7 93 18 362 = 0.0 Tota	4.9% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.3% 13.6% 6.5% 14.4% 8.4% 100.0% 102); I ² = 60	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.27 [0.03, 2.15] 3.25 [0.39, 27.35] 0.45 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0% Odds Ratio M-H, Fixed, 95% C	0.01 0.1 1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = 0 Total (95% CI) Total events Heterogeneity: Tau ² = 0 Test for overall effect: 2 Diarrhea <u>Study or Subgroup</u> Ahmed	61 100 18 15 60 15 72 214 6 156 12 257 11 919 9.50; Chi ² 2 = 2.25 (F Surv	138 20 30 25 112 29 90 60 228 12 229 30 474 48 1525 = 32.19 > = 0.02	13 3 8 9 13 8 15 1 34 2 69 4 50 14 243 0f = 13 (P) Death L Events 3 3 2 2 3 4 50 14 2 2 3 2 2 3 4 5 5 1 3 4 2 5 5 1 3 4 5 5 1 5 5 1 5 5 5 5 5 5 5 5 5 5 5 5 5	14 5 8 11 36 11 16 14 35 4 90 7 93 18 362 = 0.0 Tota	4.9% 5.1% 5.2% 6.2% 12.1% 7.2% 4.8% 4.7% 4.3% 13.6% 6.5% 14.4% 8.4% 100.0% 100.0% 12.1° 14.4% 14.4% 100.0%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.27 [0.03, 2.15] 3.25 [0.39, 27, 35] 0.45 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0% Odds Ratio M-H. Fixed, 95% C 0.17 [0.04 0.76]	0.01 0.1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = C Test for overall effect: Z Diarrhea <u>Study or Subgroup</u> Ahmed Bahat	61 10 18 15 60 15 72 12 214 6 156 6 12 257 11 919 9.50; Chi ² 2 = 2.25 (F Surv Events	138 20 30 25 112 29 90 60 228 12 229 30 60 228 12 229 30 474 48 1525 = 32.19 ≥ = 0.02 ivor s Tota 5 136 2 25 5 112 2 9 90 12 2 9 90 12 2 9 90 12 2 9 12 2 9 10 12 2 9 10 12 2 9 10 10 12 2 9 10 10 10 10 10 10 10 10 12 2 9 10 10 10 10 10 10 10 10 10 10	13 3 8 9 13 8 15 1 34 2 69 4 50 14 50 14 3 243 , df = 13 (P) Death L Events 3 3 1 1 1 1 1 1 1 1 1 1 1 1 1	14 5 8 11 36 11 16 14 35 4 90 7 93 18 362 = 0.0 Tota 12	4.9% 5.1% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.3% 13.6% 14.4% 8.4% 100.0% 102); l ² = 6 1 Weight 4 10.1% 5 2.8%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.40 [0.09, 1.83] 0.47 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.65 [0.37, 1.14] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0% Odds Ratio M-H, Fixed, 95% C 0.41 [0.04, 0.76] 0.44 [0.04, 6.16]	0.01 0.1 1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoschea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = 0 Test for overall effect: Z Diarrhea Study or Subgroup Ahmed Bahat Creput	61 10 18 15 60 15 72 214 6 156 12 257 11 919 9.50; Chi ² 2 = 2.25 (F Surv Events	138 20 30 25 112 29 90 60 228 12 229 30 474 48 1525 = 32.19 9 = 0.02 ivor s Tota 5 136 2 20 30 30 474 48	13 3 8 9 13 8 15 1 34 2 69 4 50 14 3 243 , df = 13 (P) Death <u>Levents</u> 3 3 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	14 5 8 11 36 11 16 14 35 4 90 7 93 18 362 = 0.0 12 14 35 4 90 7 93 18 362 = 0.0 14 35 4 35 4 262 12	4.9% 5.1% 5.1% 6.2% 12.1% 4.7% 4.7% 4.3% 4.3% 13.6% 6.5% 14.4% 100.0% 10.0% 10.0% 10.1% 5.2.8% 1.1% 10.1% 5.2.8%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.27 [0.03, 2.15] 3.25 [0.39, 27.35] 0.45 [0.06, 3.53] 1.00 [0.10, 9.64] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0% Odds Ratio M-H. Fixed, 95% C 0.17 [0.04, 0.76] 0.44 [0.03, 6.19] 2.4 [6] [0.46 23]	0.01 0.1 1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = C Test for overall effect: 2 Diarrhea <u>Study or Subgroup</u> Ahmed Bahat Creput Goicoechea	61 10 18 15 60 15 72 214 6 156 12 257 11 919 9.50; Chi ² 2 = 2.25 (F Surv Events 6 2 2 2 2 2 2 2 2 2 2 2 2 2	138 20 30 25 112 29 90 60 228 229 30 474 48 1525 = 32.19 2 = 0.02 s Tota 5 136 2 2 20 3 0 1525 = 32.19 2 = 0.02	13 3 8 9 13 8 15 1 34 2 69 4 50 14 2 243 , df = 13 (P) Death <u>L Events</u> 3 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	14 5 8 11 36 11 16 14 35 4 90 7 93 18 362 = 0.0 14 35 = 0.0	4.9% 5.1% 5.1% 6.2% 12.1% 4.8% 4.7% 4.9% 4.3% 13.6% 14.4% 8.4% 100.0% 12.1% 5.2.8% 3.1.3% 14.5%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.42 [0.09, 1.83] 0.42 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0% Odds Ratio M-H. Fixed, 95% C 0.17 [0.04, 0.76] 0.44 [0.03, 6.19] 2.16 [0.10, 48.21] 0.86 [0.13, 5.59] 0.86 [0.04, 0.76] 0.44 [0.03, 6.19] 2.16 [0.10, 48.21] 0.86 [0.14, 5.55] 0.86 [0.14, 5.55] 0.45 [0.14, 5.	0.01 0.1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = C Test for overall effect: Z Diarrhea <u>Study or Subgroup</u> Ahmed Bahat Creput Goicoechea Medieral-Thomas	61 10 18 15 60 15 72 12 214 6 156 6 12 257 11 919 9.50; Chi ² 2 = 2.25 (F Surv Events	138 20 30 25 112 29 90 60 228 12 29 30 228 12 29 30 474 48 1525 = 32.19 > = 0.02 ivor 5 Total 2 22 30 4 2 3 30 4 2 2 2 3 30 4 2 2 3 3 30 4 2	13 3 8 9 13 8 15 1 34 2 69 4 50 14 50 14 3 243 , df = 13 (P) Death L Events 3 3 1 0 1 0 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1	$ \begin{array}{c} 14 \\ 5 \\ 8 \\ 11 \\ 36 \\ 11 \\ 16 \\ 14 \\ 35 \\ 4 \\ 90 \\ 7 \\ 93 \\ 18 \\ 362 \\ = 0.0 \\ 14 \\ 5 \\ 8 \\ 14 \\ 5 \\ 8 \\ 14 \\ 14 \\ 14 \\ 14 \\ 14 \\ 14 \\ 14 \\ 14$	4.9% 5.1% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.9% 4.3% 13.6% 14.4% 8.4% 100.0% 102); l ² = 6(10.1% 5.2.8% 3.1.3% 4.5% 3.1.3%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.09 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.47 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 1.05 [0.00, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0% Odds Ratio M-H. Fixed, 95% C 0.17 [0.04, 0.76] 0.44 [0.03, 6.19] 2.16 [0.10, 46.21] 0.86 [0.13, 5.55] 0.45 [1.04, 0.76] 0.44 [0.03, 6.19] 2.16 [0.10, 46.21] 0.86 [0.13, 5.55] 0.61 [1.56] 0.14 [0.13, 5.55] 0.10 [1.13, 5.55] 0.10 [1.13, 5.55] 0.10 [1.13, 5.55] 0.10 [1.13, 5.55] 0.10 [1.13, 5.55] 0.10 [1.13, 5.55] 0.10 [1.14] 0.15 [1.15] 0.15 [1.	0.01 0.1 1 10 10 Favours Survivor Favours Death
Ahmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = 0 Total (95% CI) Total events Heterogeneity: Tau ² = 0 Diarrhea <u>Study or Subgroup</u> Ahmed Bahat Creput Goicoechea Medjeral-Thomas	61 10 18 15 60 01 15 72 214 6 15 12 257 11 919 9.50; Chi ² 2 = 2.25 (F Surv Events 6 2 2 2 2 2 2 2 2 2 2 2 2 2	138 20 30 25 112 29 90 60 229 30 474 48 1525 $= 32.19$ $\Rightarrow = 0.02$ ivor s Tota 5 138 2 20 3 3 3 4 25 2 20 2 20 3 3 3 3 4 25 2 20 4 25 2 20	13 3 8 9 13 8 1 34 2 69 4 50 14 2 2 4 50 14 2 2 4 50 14 1 2 2 3 3 1 1 2 4 5 0 1 1 2 4 5 0 1 1 3 4 2 6 9 4 5 1 1 3 4 2 4 5 0 9 4 5 1 1 3 4 2 6 9 4 5 0 1 1 3 4 2 4 5 0 9 4 5 0 1 1 1 2 4 5 0 9 4 5 0 1 1 1 2 4 5 0 9 4 5 0 0 1 1 1 1 0 0 0 1 1 0 0 0 1 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	14 5 8 11 16 14 35 4 90 7 93 18 362 = 0.0 12 14 35 = 0.0 14 14 35 14 15 16 11 16 14 35 4 90 7 7 93 18 3662 12 14 14 35 14 14 35 14 15 16 14 35 4 18 3662 14 14 14 3662 14 14 14 3662 14 14 14 3662 14 14 14 14 3662 14 14 14 14 3662 14 14 14 14 14 3662 14 1	4.9% 5.1% 5.1% 6.2% 12.1% 4.7% 4.9% 4.7% 4.9% 4.3% 13.6% 6.5% 14.4% 8.4% 100.0% 102; I ² = 60 100.0% 102; I ² = 60 100,0%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.27 [0.03, 2.15] 3.25 [0.39, 27.35] 0.45 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.50 [0.06, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0.54 [0.04, 0.76] 0.44 [0.03, 6.19] 2.16 [0.10, 46.21] 0.86 [0.13, 5.55] 9.60 [0.55, 166.91] 0.45 [0.05, 216.93] 0.45	0.01 0.1 1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = C Total (95% CI) Total events Heterogeneity: Tau ² = C Diarrhea <u>Study or Subgroup</u> Ahmed Bahat Creput Goicoechea Medjeral-Thomas Min Prenord	61 10 18 15 60 15 72 214 6 156 6 12 257 11 919 9.50; Chi ² = 2.25 (F Surv Events 6 2 2 2 2 2 2 2 2 2 2 2 2 2	138 20 30 25 112 29 90 60 228 12 229 30 12 229 30 60 474 48 1525 = 32.19 e 0.02 ivor s Totat 5 132 2 3 3 4 2 3 3 4 2 9 0 2 14 2 3 2 2 2 2 2 4 2 3 3 2 2 3 3 <tr< td=""><td>13 3 8 9 13 8 15 1 34 2 69 4 50 14 50 14 2 243 6f = 13 (P) Death 1 Events 3 3 0 1 3 2 4 50 13 10 10 10 10 10 10 10 10 10 10</td><td>14 5 8 11 36 14 36 14 35 4 90 7 93 18 362 = 0.0 14 $\frac{14}{5}$ 862 = 0.0 14 $\frac{14}{5}$ 14 14 15 14 15 16 14 15 16 14 15 16 14 15 16 14 15 16 14 15 16 16 16 17 16 16 18 16 18 16 12</td><td>4.9% 5.1% 5.1% 2.9% 6.2% 12.1% 4.8% 4.7% 4.3% 13.6% 4.3% 13.6% 14.4% 8.4% 100.0% 102); l² = 6l 1000% 102); l² = 6l 1000% 1000%</td><td>0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.42 [0.06, 3.53] 1.00 [0.10, 8.61] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0% Odds Ratio M-H. Fixed, 95% C 0.17 [0.04, 0.76] 0.44 [0.04, 0.76] 0.45 [0.05, 166.91] 0.86 [0.13, 5.55] 9.60 [0.55, 166.91] 0.45 [0.04, 5.55] 0.20 (0.45, 1.25] 0.20 (0.45,</td><td>0.01 0.1 10 10 Favours Survivor Favours Death</td></tr<>	13 3 8 9 13 8 15 1 34 2 69 4 50 14 50 14 2 243 6f = 13 (P) Death 1 Events 3 3 0 1 3 2 4 50 13 10 10 10 10 10 10 10 10 10 10	14 5 8 11 36 14 36 14 35 4 90 7 93 18 362 = 0.0 14 $\frac{14}{5}$ 862 = 0.0 14 $\frac{14}{5}$ 14 14 15 14 15 16 14 15 16 14 15 16 14 15 16 14 15 16 14 15 16 16 16 17 16 16 18 16 18 16 12	4.9% 5.1% 5.1% 2.9% 6.2% 12.1% 4.8% 4.7% 4.3% 13.6% 4.3% 13.6% 14.4% 8.4% 100.0% 102); l ² = 6l 1000% 102); l ² = 6l 1000% 1000%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.42 [0.06, 3.53] 1.00 [0.10, 8.61] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0% Odds Ratio M-H. Fixed, 95% C 0.17 [0.04, 0.76] 0.44 [0.04, 0.76] 0.45 [0.05, 166.91] 0.86 [0.13, 5.55] 9.60 [0.55, 166.91] 0.45 [0.04, 5.55] 0.20 (0.45, 1.25] 0.20 (0.45,	0.01 0.1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicocchea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = 0 Total (95% CI) Total events Heterogeneity: Tau ² = 0 Diarrhea <u>Study or Subgroup</u> Ahmed Bahat Creput Goicoechea Medjeral-Thomas Min Prasad	61 10 18 15 60 15 72 12 214 6 156 12 257 11 919 919 9.50; Chi ² 2 = 2.25 (F Surv Events 2 2 2 1 2 2 1 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2	138 20 30 25 112 29 90 60 228 12 229 30 474 48 1525 = 32.19 P = 0.02 ivor 5 Tota 3 3 3 4 2 2 2 2 2 3 0 12 2 2 9 0 0 0 0 0 0 0 0 0 0 0 0 0	13 3 8 9 13 8 15 1 34 2 69 4 50 14 3 243 6 6 4 50 14 3 243 6 9 4 50 14 50 50 14 50 50 14 50 50 14 50 50 14 50 50 50 50 50 50 50 50 50 50	14 5 8 11 36 14 36 14 35 4 90 7 93 18 362 = 0.0 14 4 8 14	$\begin{array}{c} 4.9\% \\ 5.1\% \\ 5.1\% \\ 2.9\% \\ 6.2\% \\ 12.1\% \\ 7.2\% \\ 4.8\% \\ 4.7\% \\ 4.3\% \\ 13.6\% \\ 6.5\% \\ 14.4\% \\ 8.4\% \\ 100.0\% \\ 102); l^2 = 6l^{10} \\ 102); l^2 = 6l^{10} \\ 101\% \\ 5 & 1.3\% \\ 1.3\% $	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.42 [0.09, 1.83] 0.42 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0% Odds Ratio M-H. Fixed, 95% C 0.17 [0.04, 0.76] 0.44 [0.03, 6.19] 2.16 [0.10, 46.21] 0.46 [0.13, 5.52] 0.45 [0.04, 5.32] 0.45 [0.04, 5.32] 0.45 [0.04, 2.32] 0.45 [0.04, 2.3	0.01 0.1 1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = 0 Total (95% CI) Total events Heterogeneity: Tau ² = 0 Test for overall effect: Z Diarrhea <u>Study or Subgroup</u> Ahmed Bahat Creput Goicoechea Medjeral-Thomas Min Prasad Quiroga	61 10 18 15 60 15 72 214 6 156 12 257 11 919 9.50; Chi ² 2 = 2.25 (F Surve Events 2 20 2	138 20 30 25 112 29 90 60 80 12 228 12 229 90 60 474 48 1525 = 32.19 P = 0.02 ivor s Tota 3 3 3 3 4 25 2 20 90 60 60 80 12 228 80 138 22 20 138 22 20 138 22 20 138 22 20 138 22 20 138 22 138 22 20 138 22 20 138 22 20 138 22 20 138 22 20 138 22 138 22 138 22 138 22 138 22 22 13 22 20 13 22 22 13 22 20 13 22 22 13 22 22 13 22 22 13 22 22 13 22 22 13 22 22 13 22 22 13 22 22 13 22 22 13 22 22 13 22 22 13 22 22 13 22 22 13 22 22 13 22 22 13 22 22 20 13 22 22 20 22 22 20 22 20 20 20	13 3 8 9 13 8 15 1 34 2 69 4 50 14 2 2 4 50 14 2 2 4 50 14 2 2 3 3 1 5 14 2 5 14 15 14 2 10 14 15 14 2 10 14 15 14 10 14 15 14 15 14 15 14 15 14 15 14 15 14 15 16 16 16 16 16 16 16 16 16 16	14 5 8 11 16 11 16 14 35 4 90 7 93 18 662 = 0.0 12 14 5 8 62 14 14 14 14 14 14 14 14 15 14 15 14 15 14 11 15 14 11 15 14 11 16 11 16 11 16 11 16 11 16 11 16 11 16 11 16 11 16 11 16 11 16 11 16 11 16 11 16 11 16 16	4.9% 5.1% 5.1% 6.2% 12.1% 4.8% 4.7% 4.9% 4.3% 13.6% 6.5% 14.4% 8.4% 100.0% 100.0% 114.4% 8.4% 100.0% 114.5% 114.5% 113.6% 113.6% 114.5% 113.6% 114.5%114.5% 114.5% 114.5% 114.5% 114.5%114.5% 114.5% 114.5% 114.5% 114.5%114.5% 114.5% 114.5% 114.5% 114.5% 114.5%114.5% 114.5% 114.5% 114.5%114.5% 114.5% 114.5%114.5% 114.5% 114.5%114.5% 114.5% 114.5%114.5% 114.5%114.5% 114.5% 114.5%114.5% 114.5% 114.5%114.5% 114.5%114.5% 114.5%114.5% 114.5%114.5% 114.5%114.5% 114.5%114.5% 114.5%114.5% 114.5%114.5% 114.5%114.5% 114.5%114.5% 114.5%114.5% 114.5%114.5% 114.5%114.5% 114.5%114.5% 114.5%114.5%114.5% 114.5%114.5%114.5%114.5% 114.5%114.5%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.42 [0.06, 3.53] 1.00 [0.10, 9.61] 1.65 [0.37, 1.14] 0.55 [0.39, 27.35] 0.45 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0.60 [0.55, 166.91] 0.45 [0.04, 3.55] 9.60 [0.55, 166.91] 0.45 [0.04, 3.452] 0.39 [0.12, 1.31] 1.17 [0.04, 3.452] 0.51 [0.12, 1.31] 1.17 [0.04, 3.452] 0.52 [0.55, 166.91] 0.45 [0.12, 1.31] 1.17 [0.04, 3.452] 0.51 [0.12, 1.31] 1.17 [0.04, 3.452] 0.55 [0.55, 166.91] 0.45 [0.12, 1.31] 1.17 [0.04, 3.452] 0.55 [0.12, 1.31] 1.17 [0.14, 3.452] 1.55 [0.12, 1.31] 1.55 [0.12, 1.31]	0.01 0.1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = 0 Total (95% CI) Total events Heterogeneity: Tau ² = 0 Test for overall effect: 2 Diarrhea <u>Study or Subgroup</u> Ahmed Bahat Creput Goicoechea Medjeral-Thomas Min Prasad Quiroga	61 10 18 15 60 15 72 214 6 12 257 11 919 9.50; Chi ² 2 = 2.25 (F Surv Events 6 2 2 2 1 2 3 4 3 4 5 5 5 2 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 5 5 5 5 5 5 5 5 5 5 5 5 5	138 20 30 25 112 29 90 60 228 12 29 90 228 12 229 30 474 48 1525 5 5 152 5 5 12 2 60 2 2 2 2 2 3 </td <td>13 3 8 9 13 8 15 1 34 2 69 4 50 14 50 14 2243 3 4 50 14 50 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 15 14 50 14 50 14 50 14 50 14 50 14 50 15 15 15 15 15 15 15 15 15 15</td> <td>14 5 8 11 36 11 16 4 90 7 93 18 35 4 93 18 36 2 2 10 14 35 4 93 18 36 2 2 2 10 10 11 11 11 12 35 35 12</td> <td>4.9% 5.1% 5.1% 2.9% 6.2% 12.1% 4.8% 4.7% 4.9% 4.3% 13.6% 14.4% 8.4% 100.0</td> <td>0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.47 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.65 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0% Odds Ratio M-H. Fixed, 95% C 0.17 [0.04, 0.76] 0.44 [0.03, 6.19] 2.16 [0.10, 46.21] 0.86 [0.13, 5.55] 9.60 [0.55, 166.91] 0.45 [0.04, 3.452] 0.39 [0.12, 1.31] 1.17 [0.04, 3.452] 0.95 [0.44, 1.04, 3.452] 0.95 [0.45, 1.04, 3.452] 0.</td> <td>0.01 0.1 1 10 10 Favours Survivor Favours Death</td>	13 3 8 9 13 8 15 1 34 2 69 4 50 14 50 14 2243 3 4 50 14 50 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 14 50 15 14 50 14 50 14 50 14 50 14 50 14 50 15 15 15 15 15 15 15 15 15 15	14 5 8 11 36 11 16 4 90 7 93 18 35 4 93 18 36 2 2 10 14 35 4 93 18 36 2 2 2 10 10 11 11 11 12 35 35 12	4.9% 5.1% 5.1% 2.9% 6.2% 12.1% 4.8% 4.7% 4.9% 4.3% 13.6% 14.4% 8.4% 100.0	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.47 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.65 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0% Odds Ratio M-H. Fixed, 95% C 0.17 [0.04, 0.76] 0.44 [0.03, 6.19] 2.16 [0.10, 46.21] 0.86 [0.13, 5.55] 9.60 [0.55, 166.91] 0.45 [0.04, 3.452] 0.39 [0.12, 1.31] 1.17 [0.04, 3.452] 0.95 [0.44, 1.04, 3.452] 0.95 [0.45, 1.04, 3.452] 0.	0.01 0.1 1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = 0 Total (95% CI) Total events Heterogeneity: Tau ² = 0 Diarrhea <u>Study or Subgroup</u> Ahmed Bahat Creput Goicoechea Medjeral-Thomas Min Prasad Quiroga Sosa Stefan	61 10 18 15 60 01 15 72 214 6 15 12 257 11 919 9.50; Chi ² 2 = 2.25 (F Surv Events 2 2 2 1 2 2 2 1 2 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2	138 20 30 25 112 29 90 60 228 12 229 90 60 228 12 229 90 60 228 1525 = 32.19 > = 0.02 ivor s 5 132 2 14 2 15 2 10 2 11 2 12 2 12 2 12 2 12 2 12 2 12 2 12 2 2 30 31 32 32 32	13 3 8 9 13 8 15 1 34 269 4 50 0 14 243 0 14 Death Death Death Death Death Death Death 1 243 0 0 0 14 Death 1 1 243 0 0 0 14 Death 1 1 1 243 0 0 14 Death 1 1 1 1 1 3 4 5 1 1 3 4 5 1 1 3 4 5 1 1 3 4 5 1 1 1 1 1 1 1 1	$ \begin{array}{c} 14 \\ 5 \\ 8 \\ 11 \\ 16 \\ 14 \\ 90 \\ 7 \\ 93 \\ 18 \\ 862 \\ = 0.0 \\ 14 \\ 5 \\ 16 \\ 14 \\ 5 \\ 862 \\ 17 \\ 16 \\ 14 \\ 5 \\ 862 \\ 17 \\ 16 \\ 14 \\ 35 \\ 90 \\ 7 \\ 16 \\ 14 \\ 35 \\ 90 \\ 7 \\ 16 \\ 16 \\ 16 \\ 16 \\ 16 \\ 16 \\ 16 \\ 16$	4.9% 5.1% 5.1% 2.9% 4.2% 12.1% 4.7% 4.7% 4.9% 4.7% 4.9% 4.3% 13.6% 6.5% 14.4% 8.4% 100.0% 12.1% 4.7% 4.3% 13.6% 5.1% 14.4% 10.1% 5.1% 1.2% 1.2	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.47 [0.09, 1.83] 0.47 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0% Odds Ratio M-H. Fixed, 95% C 0.17 [0.04, 0.76] 0.44 [0.03, 6.19] 2.16 [0.10, 46.21] 0.86 [0.13, 5.55] 9.60 [0.55, 166.91] 0.45 [0.04, 5.23] 0.53 [0.32, 1.131] 1.17 [0.04, 8, 1.86] 0.43 [0.03, 5.53] 0.43 [0.03, 5.53] 0.43 [0.03, 5.53] 0.45 [0.04, 8, 1.86] 0.43 [0.03, 5.53] 0.45 [0.05, 5.53] 0.45 [0.05, 5.53] 0.45 [0.05, 5.53] 0.45 [0.04, 8, 1.86] 0.43 [0.03, 5.53] 0.45 [0.05, 5	0.01 0.1 1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau² = 0 Total (95% CI) Total events Heterogeneity: Tau² = 0 Total (95% CI) Total events Heterogeneity: Tau² = 0 Total ovents Heterogeneity: Tau² = 0 Total (95% CI) Total events Heterogeneity: Tau² = 0 Sosoo Sosoo Sosoo Stefan Turgutalp	61 10 18 15 60 15 72 214 6 156 12 214 6 12 257 11 919 919 9.50; Chi ² 2 = 2.25 (F Surv Events 2 2 2 2 1 2 2 1 2 1 2 2 1 4 6 1 5 2 2 2 1 2 1 2 2 1 4 6 1 5 2 2 2 1 2 1 2 2 1 4 6 1 5 2 2 2 1 2 2 1 4 6 1 5 2 2 2 1 2 1 2 2 1 4 6 1 5 2 2 2 57 1 1 2 2 2 5 7 2 2 7 2 7 2 7 2 7 2 7 2 7 2	138 20 30 25 112 29 90 228 122 229 90 228 122 30 474 48 1525 5 Total 2 30 4 22 2 1 22 30 1 2 1 2 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 3 3 3 3 3 3 <td< td=""><td>13 3 8 9 13 8 15 1 34 2 69 4 50 14 2 243 , df = 13 (P) Death <u>L Events</u> 3 1 1 2 2 3 2 4 50 14 2 2 3 2 14 2 2 3 14 2 2 2 3 2 14 2 2 2 3 2 14 2 2 3 2 15 14 2 2 14 2 2 14 2 2 2 3 14 2 2 14 2 15 14 2 2 2 3 1 1 1 2 2 1 1 1 2 2 1 1 2 1 1 1 2 1 2 1 2 1 1 1 2 1 2 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1</td><td>$\begin{array}{c} 14\\ 5\\ 8\\ 11\\ 36\\ 11\\ 16\\ 4\\ 90\\ 7\\ 93\\ 18\\ 362\\ = 0.0\\ 14\\ 4\\ 8\\ 10\\ 14\\ 38\\ 2\\ 9\\ 3\\ 3\\ 9\\ 3\end{array}$</td><td>4.9% 5.1% 5.1% 6.2% 12.1% 4.8% 4.7% 4.3% 13.6% 4.3% 13.6% 14.4% 8.4% 100.0% 102); I² = 61 10.1% 5 2.8% 3 1.3% 5 1.2.7% 4 3.0% 5 1.2.7% 4 1.2% 0 3.0% 5 1.2.7% 4 3.0% 5 2.1.2%</td><td>0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.27 [0.03, 2.16] 3.25 [0.39, 27.35] 0.45 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0.54 [0.10, 4.52] 9.60 [0.55, 166.91] 0.45 [0.04, 3.53] 9.60 [0.55, 166.91] 0.45 [0.04, 3.452] 0.39 [0.43, 4.52] 0.39 [0.43, 4.52] 0.39 [0.44, 1.86] 0.43 [0.3, 5.53] 0.40 [0.16, 1.01] 0.45 [0.04, 3.452] 0.45 [0.04, 3.452] 0.45 [0.04, 3.452] 0.45 [0.04, 3.452] 0.45 [0.04, 5.45] 0.40 [0.15, 1.51] 0.45 [0.04, 3.452] 0.45 [0.04, 3.452] 0.45 [0.04, 3.452] 0.45 [0.04, 5.453] 0.40 [0.16, 1.01] 0.45 [0.16, 1.01]</td><td>0.01 0.1 10 10 Favours Survivor Favours Death</td></td<>	13 3 8 9 13 8 15 1 34 2 69 4 50 14 2 243 , df = 13 (P) Death <u>L Events</u> 3 1 1 2 2 3 2 4 50 14 2 2 3 2 14 2 2 3 14 2 2 2 3 2 14 2 2 2 3 2 14 2 2 3 2 15 14 2 2 14 2 2 14 2 2 2 3 14 2 2 14 2 15 14 2 2 2 3 1 1 1 2 2 1 1 1 2 2 1 1 2 1 1 1 2 1 2 1 2 1 1 1 2 1 2 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1	$\begin{array}{c} 14\\ 5\\ 8\\ 11\\ 36\\ 11\\ 16\\ 4\\ 90\\ 7\\ 93\\ 18\\ 362\\ = 0.0\\ 14\\ 4\\ 8\\ 10\\ 14\\ 38\\ 2\\ 9\\ 3\\ 3\\ 9\\ 3\end{array}$	4.9% 5.1% 5.1% 6.2% 12.1% 4.8% 4.7% 4.3% 13.6% 4.3% 13.6% 14.4% 8.4% 100.0% 102); I ² = 61 10.1% 5 2.8% 3 1.3% 5 1.2.7% 4 3.0% 5 1.2.7% 4 1.2% 0 3.0% 5 1.2.7% 4 3.0% 5 2.1.2%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.27 [0.03, 2.16] 3.25 [0.39, 27.35] 0.45 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0.54 [0.10, 4.52] 9.60 [0.55, 166.91] 0.45 [0.04, 3.53] 9.60 [0.55, 166.91] 0.45 [0.04, 3.452] 0.39 [0.43, 4.52] 0.39 [0.43, 4.52] 0.39 [0.44, 1.86] 0.43 [0.3, 5.53] 0.40 [0.16, 1.01] 0.45 [0.04, 3.452] 0.45 [0.04, 3.452] 0.45 [0.04, 3.452] 0.45 [0.04, 3.452] 0.45 [0.04, 5.45] 0.40 [0.15, 1.51] 0.45 [0.04, 3.452] 0.45 [0.04, 3.452] 0.45 [0.04, 3.452] 0.45 [0.04, 5.453] 0.40 [0.16, 1.01] 0.45 [0.16, 1.01]	0.01 0.1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicocchea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total (95% CI) Total events Heterogeneity: Tau ² = 0 Test for overall effect: 2 Diarrhea <u>Study or Subgroup</u> Ahmed Bahat Creput Goicoechea Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou	61 10 18 15 60 15 72 214 6 156 6 12 257 11 919 9.50; Chi ² 2 = 2.25 (F Surv Events 6 2 2 2 1 2 3 4 3 4 3 4 5 6 15 12 2 5 5 5 5 5 5 5 5 5 5 5 5 5	$\begin{array}{c} 138\\ 20\\ 30\\ 25\\ 112\\ 29\\ 90\\ 60\\ 228\\ 12\\ 229\\ 30\\ 474\\ 48\\ 1525\\ = 32.19\\ 229\\ 30\\ 474\\ 48\\ 1525\\ = 32.19\\ 220\\ 30\\ 474\\ 48\\ 1525\\ 20\\ 30\\ 10\\ 226\\ 10\\ 22\\ 60\\ 10\\ 226\\ 10\\ 22\\ 60\\ 10\\ 226\\ 60\\ 10\\ 226\\ 60\\ 10\\ 226\\ 60\\ 10\\ 226\\ 60\\ 10\\ 226\\ 60\\ 10\\ 226\\ 60\\ 10\\ 226\\ 60\\ 10\\ 226\\ 60\\ 10\\ 226\\ 60\\ 10\\ 226\\ 60\\ 10\\ 226\\ 60\\ 10\\ 226\\ 60\\ 10\\ 20\\ 10\\ 10\\ 10\\ 10\\ 10\\ 10\\ 10\\ 10\\ 10\\ 1$	13 3 8 9 13 8 15 1 34 2 69 4 50 10 10 10 10 10 10 10 10 10 1	14 5 8 11 36 11 16 14 35 4 90 7 93 18 662 = 0.0 7 14 5 8 62 = 0.0 7 14 5 8 62 14 14 35 4 90 7 93 18 662 11 16 14 35 11 16 14 35 11 16 11 16 14 35 18 8 62 11 16 17 16 17 17 18 8 62 11 16 17 18 18 18 18 18 18 18 18 18 18 18 18 18	4.9% 5.1% 5.1% 2.9% 6.2% 12.1% 7.2% 4.8% 4.7% 4.9% 4.3% 13.6% 14.4% 8.4% 100.0% 102); l ² = 6 100.0% 102); l ² = 6 100.0% 102); l ² = 6 100.0% 102; l ² = 6 100.0% 102; l ² = 6 100.0% 1	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.40 [0.09, 1.83] 0.47 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.65 [0.37, 1.14] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0% Odds Ratio M-H, Fixed, 95% C 0.17 [0.04, 0.76] 0.44 [0.03, 6.19] 2.16 [0.10, 46.21] 0.86 [0.13, 5.55] 9.60 [0.55, 166.91] 0.45 [0.04, 3.422] 0.39 [0.12, 1.31] 1.17 [0.04, 3.452] 0.95 [0.48, 1.86] 0.43 [0.03, 5.53] 0.40 [0.35, 553] 0.40 [0.35, 553] 0.40 [0.35, 553] 0.40 [0.16, 1.01] 0.53 [0.08, 3.49]	0.01 0.1 1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = 0 Total (95% CI) Total events Heterogeneity: Tau ² = 0 Diarrhea <u>Study or Subgroup</u> Ahmed Bahat Creput Goicoechea Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou	61 10 18 15 60 15 72 214 6 15 12 214 6 156 12 257 11 919 9.50; Chi ² 2 = 2.25 (F Surv Events 2 2 2 1 2 2 1 2 2 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2	$\begin{array}{c} 138\\ 138\\ 20\\ 30\\ 25\\ 51\\ 29\\ 90\\ 228\\ 12\\ 29\\ 90\\ 228\\ 12\\ 229\\ 30\\ 474\\ 48\\ 1525\\ = 32.19\\ 9 = 0.02\\ 474\\ 48\\ 1525\\ = 32.19\\ 229\\ 30\\ 1525\\ 222\\ 220\\ 14\\ 22\\ 20\\ 122\\ 12\\ 22\\ 33\\ 34\\ 22\\ 25\\ 44\\ 22\\ 23\\ 35\\ 47\\ 48\\ 22\\ 23\\ 35\\ 47\\ 48\\ 22\\ 23\\ 35\\ 47\\ 48\\ 22\\ 23\\ 35\\ 47\\ 48\\ 22\\ 23\\ 35\\ 47\\ 48\\ 22\\ 23\\ 35\\ 47\\ 48\\ 22\\ 23\\ 35\\ 47\\ 48\\ 22\\ 23\\ 35\\ 47\\ 48\\ 22\\ 23\\ 35\\ 47\\ 48\\ 22\\ 23\\ 35\\ 47\\ 48\\ 22\\ 35\\ 47\\ 48\\ 28\\ 28\\ 28\\ 28\\ 28\\ 28\\ 28\\ 28\\ 28\\ 2$	13 3 8 9 13 8 1 34 2 69 4 50 14 2 2 4 50 14 2 2 4 50 14 2 2 4 50 14 2 2 4 50 14 2 2 3 1 1 3 4 2 4 5 1 1 3 4 2 4 5 1 1 2 4 5 1 1 3 4 2 4 5 1 1 3 4 2 5 9 4 5 1 1 3 4 2 4 5 1 1 3 4 2 4 5 1 1 1 2 4 5 1 1 1 2 4 5 1 1 2 4 5 1 1 2 4 5 1 1 2 4 5 1 1 2 4 5 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1	$ \begin{array}{c} 14 \\ 5 \\ 8 \\ 11 \\ 36 \\ 11 \\ 16 \\ 90 \\ 7 \\ 93 \\ 18 \\ 362 \\ = 0.0 \\ \hline 14 \\ 8 \\ 16 \\ 14 \\ 36 \\ 16 \\ 14 \\ 36 \\ 16 \\ 16 \\ 14 \\ 36 \\ 16 \\ 16 \\ 14 \\ 36 \\ 16 \\ 16 \\ 16 \\ 16 \\ 16 \\ 16 \\ 16 \\ 1$	4.9% 5.1% 5.1% 2.9% 6.2% 12.1% 4.8% 4.7% 4.7% 4.7% 4.7% 6.5% 14.4% 8.4% 100.0% 10.0% 12.1% 5.2.8% 3.1.3% 4.1.3% 4.3.0% 5.2.8% 3.1.3% 4.3.0% 5.2.8% 3.1.3% 4.3.0% 5.2.8% 3.1.3% 4.3.0% 5.2.8% 3.1.3% 4.3.0% 5.2.8% 3.1.3% 4.3.0% 5.2.8% 3.1.3% 4.3.0% 5.2.8% 5.3.8% 5.3%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.47 [0.09, 1.83] 0.47 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0% Odds Ratio M-H. Fixed, 95% C 0.17 [0.04, 0.76] 0.44 [0.03, 6.19] 0.45 [0.10, 46.21] 0.45 [0.10, 46.21] 0.45 [0.10, 46.23] 0.45 [0.10, 46.23] 0.45 [0.148, 1.86] 0.43 [0.03, 5.53] 0.40 [0.16, 1.04] 0.45 [0.04, 8.186] 0.43 [0.03, 5.53] 0.40 [0.16, 1.01] 0.53 [0.08, 3.49] 0.53 [0.08, 3.49] 0.53 [0.08, 3.49] 0.53 [0.08, 3.49] 0.53 [0.08, 3.49] 0.53 [0.08, 3.49] 0.54 [0.05, 5.53] 0.40 [0.16, 1.01] 0.53 [0.08, 3.49] 0.55 [0.55, 3.55] 0.55 [0.55	0.01 0.1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = 0 Total (95% CI) Total events Heterogeneity: Tau ² = 0 Total events Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI)	61 100 18 15 60 15 72 214 6 156 12 257 11 919 9.50; Chi ² 2 = 2.25 (F Surv Events 2 = 2.25 (F 2 = 2.25 (F) 3 = 2.25 (F) 2 = 2.25 (F) 2 = 2.25 (F) 2 = 2.25 (F) 3 = 2.25 (F)	$\begin{array}{c} 138\\ 138\\ 20\\ 30\\ 25\\ 112\\ 29\\ 90\\ 228\\ 12\\ 229\\ 30\\ 474\\ 47\\ 5\\ 1525\\ = 32.19\\ 229\\ 30\\ 474\\ 47\\ 1525\\ = 32.19\\ 229\\ 30\\ 474\\ 4 \\ 222\\ 30\\ 1225\\ 1 \\ 22\\ 30\\ 3 \\ 4 \\ 22\\ 3 \\ 3 \\ 4 \\ 1384\\ 4 \\ 1384\\$	13 3 8 9 13 8 15 1 34 2 69 4 50 14 14 50 14 50 14 14 14 14 14 14 14 14 14 14	14 5 8 11 36 11 16 14 35 4 90 7 93 18 362 = 0.0 14 5 8 62 = 0.0 14 5 8 14 14 35 4 90 90 90 90 90 90 90 90 90 90	4.9% 5.1% 5.1% 2.9% 6.2% 12.1% 4.8% 4.7% 4.9% 4.3% 13.6% 14.4% 8.4% 100.0% 10.0% 14.4% 100.0% 10.1% 5.2.8% 3.1.3% 4.3.0% 5.12.7% 4.3.0% 5.12.7% 4.3.0% 5.12.7% 5.2.8% 3.1.3% 4.3.0% 5.12.7% 5.3% 5.3% 5.3%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.27 [0.03, 2.15] 3.25 [0.39, 27.35] 0.45 [0.06, 3.53] 1.00 [0.10, 8.61] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0.55 [0.55, 166.91] 0.45 [0.04, 5.55] 0.45 [0.04, 3.55] 0.45 [0.04, 3.452] 0.95 [0.44, 1.86] 0.43 [0.04, 5.53] 0.45 [0.04, 5.53] 0.45 [0.04, 3.452] 0.95 [0.44, 1.68] 0.43 [0.03, 5.53] 0.40 [0.16, 1.01] 0.53 [0.08, 3.49] 0.74 [0.49, 1.10]	0.01 0.1 1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = O Test for overall effect: Z Diarrhea <u>Study or Subgroup</u> Ahmed Bahat Creput Goicoechea Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total (95% CI)	61 10 18 15 60 15 72 214 6 156 6 12 257 11 919 9.50; Chi ² 2 = 2.25 (F Surv Events 2 2 2 1 2 3 4 2 3 4 5 6 12 2 5 5 5 2 2 2 1 2 1 2 1 2 1 2 1 2 2 5 5 5 5 5 5 5 5 5 5 5 5 5	$\begin{array}{c} 138\\ 138\\ 20\\ 30\\ 25\\ 112\\ 29\\ 90\\ 60\\ 228\\ 12\\ 229\\ 30\\ 474\\ 48\\ 1525\\ = 32.19\\ 229\\ 30\\ 474\\ 48\\ 1525\\ = 32.19\\ 220\\ 30\\ 474\\ 48\\ 1525\\ = 32.19\\ 20\\ 0.0\\ 0 \\ 0 \\ 122\\ 20\\ 0 \\ 122\\ 20\\ 30\\ 48\\ 22\\ 30\\ 48\\ 48\\ 1384\\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 48\\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3 \\ 3$	13 3 8 9 13 8 15 1 34 2 69 4 50 14 14 14 14 14 14 14 14 14 14	$ \begin{array}{c} 14 \\ 5 \\ 8 \\ 11 \\ 36 \\ 11 \\ 16 \\ 14 \\ 35 \\ 90 \\ 7 \\ 93 \\ 18 \\ 362 \\ = 0.0 \\ 14 \\ \frac{1}{2} \\ \frac{1}{2} \\ 90 \\ 12 \\ 16 \\ 315 \\ 31$	$\begin{array}{c} 4.9\% \\ 5.1\% \\ 5.1\% \\ 2.9\% \\ 6.2\% \\ 12.1\% \\ 7.2\% \\ 4.8\% \\ 4.7\% \\ 4.9\% \\ 4.3\% \\ 13.6\% \\ 14.4\% \\ 8.4\% \\ 100.0\% \\ 102); l^2 = 6l^{10} \\ 100.0\% \\ 102; l^2 = 6l^{10} \\ 100.0\% \\ 100.0$	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.40 [0.09, 1.83] 0.47 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.65 [0.37, 1.14] 0.65 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0% Odds Ratio M-H. Fixed, 95% C 0.17 [0.04, 0.76] 0.44 [0.04, 0.73] 0.45 [0.04, 5.32] 0.39 [0.12, 1.31] 1.17 [0.04, 3.452] 0.95 [0.48, 1.86] 0.43 [0.03, 5.48] 0.43 [0.03, 5.48] 0.44 [0.04, 3.452] 0.95 [0.48, 1.86] 0.43 [0.03, 5.53] 0.40 [0.16, 1.01] 0.53 [0.08, 3.49] 0.74 [0.49, 1.10]	0.01 0.1 1 10 10 Favours Survivor Favours Death
Anmed Bahat Creput Goicoechea Hendra Mazzoleni Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Tau ² = 0 Total (95% CI) Total events Heterogeneity: Tau ² = 0 Diarrhea Study or Subgroup Ahmed Bahat Creput Goicoechea Medjeral-Thomas Min Prasad Quiroga Sosa Stefan Turgutalp Zou Total (95% CI) Total events Heterogeneity: Chi ² =	61 10 18 15 60 01 15 72 214 6 156 12 257 11 919 9.50; Chi ² 2 = 2.25 (F Surv Events 2 2 1 2 2 1 2 2 1 2 2 2 5 2 2 2 2 2 2 2 2 2 2 2 2 2	138 20 30 25 29 90 228 112 229 90 228 122 30 229 30 229 30 229 300 474 48 1525 ivor is Total 5 136 2 20 1 122 1 122 1 122 1 122 1 122 2 3 4 22 2 3 4 22 3 4 2 3 4 22 5 474 3 4 2 3 4 3 4 3	13 3 8 9 13 8 1 34 2 69 4 50 14 2 2 4 50 14 2 2 4 50 14 2 2 4 50 14 2 2 4 50 14 2 2 4 50 14 2 2 3 3 1 1 2 2 3 1 1 2 4 5 5 1 1 3 4 2 5 9 4 5 5 1 1 3 4 2 5 9 4 5 5 1 1 1 2 4 5 5 5 1 1 1 2 4 5 5 5 1 1 1 2 4 5 5 5 1 1 1 2 1 5 5 5 5 1 1 1 2 1 5 5 5 5 1 1 1 1 5 5 5 5 5 5 5 5 5 5 5 5 5	$\begin{array}{c} 14 \\ 5 \\ 8 \\ 11 \\ 36 \\ 11 \\ 16 \\ 14 \\ 35 \\ 4 \\ 90 \\ 7 \\ 93 \\ 18 \\ 862 \\ = 0.0 \\ 14 \\ \frac{5}{2} \\ \frac{5}{2} \\ 14 \\ 36 \\ 2 \\ 90 \\ 16 \\ 315 \\ = 2\% \end{array}$	4.9% 5.1% 5.1% 2.9% 4.2% 12.1% 4.7% 4.9% 4.3% 13.6% 6.5% 14.4% 8.4% 100.0% 102; I ² = 60 100.0% 11,2% 10,1% 5,2.8% 3,1.3% 4,1.3% 4,1.3% 5,12.7% 4,1.2% 5,2.8% 5,100.0% 5,100.0% 5,100.0%	0.06 [0.01, 0.48] 0.67 [0.09, 4.89] 0.99 [0.00, 1.65] 0.33 [0.06, 1.88] 2.04 [0.94, 4.43] 0.40 [0.09, 1.83] 0.47 [0.09, 1.83] 0.47 [0.06, 3.53] 1.00 [0.10, 9.61] 0.65 [0.37, 1.14] 0.50 [0.09, 2.64] 1.02 [0.65, 1.59] 0.08 [0.02, 0.31] 0.53 [0.31, 0.92] 0.53 [0.31, 0.92] 0% Odds Ratio M-H. Fixed, 95% C 0.17 [0.04, 0.76] 0.44 [0.03, 6.19] 2.16 [0.10, 45.21] 0.45 [0.04, 5.32] 0.39 [0.12, 1.31] 1.17 [0.04, 3.53] 0.43 [0.03, 5.53] 0.40 [0.16, 1.01] 0.53 [0.08, 3.49] 0.74 [0.49, 1.10]	0.01 0.1 1 10 10 Odds Ratio M-H. Fixed, 95% Cl 0.01 0.1 1 10 1

Figure 4. Forest plots depict the comparison of clinical manifestations in survivor and non-survivor groups.

Patients with cardiovascular or respiratory disease have weakened cardiac or pulmonary function, which makes them more likely to have acute cardiovascular events or develop ARDS; thus, they were considered risk factors for disease progression. However, hypertension and diabetes were shown to be risk factors in the general population and are probably not predictors of mortality in HD patients.

Albumin

	Su	rvivo	or	D	eath			Mean Difference		Mean	Difference	e	
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Random, 95% C		IV, Ran	dom, 95%	CI	
Goicoechea	37	4	25	40	9	11	7.8%	-3.00 [-8.54, 2.54]			-		
Hendra	35.9	4.3	112	31.89	4.7	36	21.3%	4.01 [2.28, 5.74]			-		
Islam	36.5	5.2	28	33	2.3	6	16.9%	3.50 [0.84, 6.16]			-		
Min	40	3.7	60	35	7.8	14	11.1%	5.00 [0.81, 9.19]			-		
Shang	34.6	3.9	38	29.9	5.7	9	12.0%	4.70 [0.78, 8.62]			-		
Sipahi	30	13	20	31	6.8	3	3.2%	-1.00 [-10.57, 8.57]		-	+		
Stefan	37	5	30	27	5.5	7	10.4%	10.00 [5.55, 14.45]			-		
Zou	38.1	3.8	48	35.3	5	18	17.4%	2.80 [0.25, 5.35]			-		
Total (95% CI)			361			104	100.0%	3.82 [1.98, 5.66]		1	٠		
Heterogeneity: Tau ² =	3.38; Cł	1i² = 1	15.41, d	df = 7 (F	P = 0.	03); l² =	= 55%		-100	-50	Ó	50	100
Test for overall effect:	Z = 4.06	6 (P <	0.0001	1)						Favours Survivo	Favour	s Death	

Leucocytes

	Su	irvivo	r	0	Death			Mean Difference		Mean	Differe	nce	
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Fixed, 95% C		IV, Fiz	ed. 95	% CI	
Bahat	7.8	3.5	20	6	2.1	5	8.6%	1.80 [-0.60, 4.20]			-		
Hendra	5.5	2	112	7.6	3.2	36	40.2%	-2.10 [-3.21, -0.99]			-		
Islam	5.66	2.03	28	6.8	2	6	15.8%	-1.14 [-2.91, 0.63]			1		
Min	5.8	3	60	6.8	3	14	16.2%	-1.00 [-2.75, 0.75]			1		
Shang	5.09	1.76	38	7.17	2.37	9	18.2%	-2.08 [-3.73, -0.43]					
Stefan	7	2.5	30	11.5	9.7	7	0.9%	-4.50 [-11.74, 2.74]		-	+		
Total (95% CI)			288			77	100.0%	-1.45 [-2.16, -0.75]			(1	
Heterogeneity: Chi ² =	10.00, d	f = 5 (F	P = 0.08	3); l² = 5	50%				-100	-50	ò	50	100
Test for overall effect:	Z = 4.05	6 (P < 0	0.0001)							Favours Survivo	or Fav	ours Death	

Hemoglobin

-	Su	rvivo	r	D	eath			Mean Difference		Mean	Differenc	е	
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Fixed, 95% CI		IV, Fi	ed. 95%	CI	
Bahat	104	18	20	104	14	5	6.2%	0.00 [-14.59, 14.59]		-	-		
Goicoechea	106	15	25	106	11	11	17.2%	0.00 [-8.77, 8.77]			+-		
Hendra	107	15	112	109	16	36	37.8%	-2.00 [-7.92, 3.92]			+		
Islam	110	17	28	119	7	6	18.7%	-9.00 [-17.43, -0.57]			-		
Min	104	15	60	95	27	14	6.2%	9.00 [-5.64, 23.64]			+		
Stefan	112	12	30	90	30	7	2.6%	22.00 [-0.63, 44.63]			-		
Zou	104	20	48	102	20	18	11.3%	2.00 [-8.83, 12.83]			+-		
Total (95% CI)) co df	- 6 / Г	323	4), 12 - 2	000/	97	100.0%	-1.08 [-4.72, 2.56]	ī—		•		
Telefogeneity. Chi :	7 – 0 F9	- 0 (F	-0.12	+), 1 3	0070				-100	-50	0	50	100
rest for overall effect.	2 = 0.56	(P =	0.56)							Favours Surviv	or Favou	rs Death	

Platelet

	Su	rvivo	or	D	eath			Mean Difference		Mean [Difference		
Study or Subgroup	Mean	SD	Total	Mean	SD	Total	Weight	IV, Fixed, 95% C		IV, Fix	ed, 95% C		
Bahat	195	69	20	169	52	5	7.7%	26.00 [-28.70, 80.70]		1	-		_
Goicoechea	174	58	25	137	83	11	7.9%	37.00 [-17.06, 91.06]					
Hendra	179	47	112	173	77	36	32.6%	6.00 [-20.62, 32.62]			+		
Islam	176	61	28	169	42	6	14.1%	7.00 [-33.50, 47.50]			-		
Min	144	47	60	131	87	14	10.4%	13.00 [-34.10, 60.10]			-		
Shang	197	84	38	181	80	9	6.7%	16.00 [-42.69, 74.69]			· ·		-
Zou	170	69	48	142	59	18	20.6%	28.00 [-5.52, 61.52]					
Total (95% CI)			331			99	100.0%	16.06 [0.86, 31.26]	L		•		
Heterogeneity: Chi ² =	1.95, df	= 6 (F	$^{2} = 0.92$	2); $I^2 = 0$)%				-100	-50	ò	50	100
Test for overall effect:	Z = 2.07	(P =	0.04)							Favours Survivo	r Favours	s Death	

Figure 5. Forest plots depict the comparison of laboratory examination in survivor and non-survivor groups.

COVID-19 patients with CKD have a high incidence of neutrophilia, poor prognosis, and in-hospital death, with dialysis patients being more vulnerable [49]. The most common clinical symptoms of COVID-19 are fever, cough, dyspnea, and diarrhea, which are the same in HD and non-HD patients [50–53]. A European study

identified that infection-related pulmonary symptoms, such as fever, cough, and dyspnea, were more prevalent in patients with moderate-to-severe COVID-19 [54]. Another study also revealed that fever and cough were risk factors for deterioration in COVID-19 patients [55]. In our meta-analysis, we found that fever, cough, and dyspnea were risk factors for death in HD patients with COVID-19. On one hand, patients with these infectionrelated respiratory symptoms have poor lung function and low oxygen levels. On the other hand, cough and dyspnea could be the main symptoms of hypervolemia, which is frequently encountered in HD patients. Similar to previous studies in the general population, we also found that higher leucocyte and platelet count, and hypoalbuminemia were associated with higher mortality rate in HD patients [56-60]. Platelet activation plays an important role in inflammation [61]. Studies have shown that a low level of platelets contributed to COVID-19 severity [62,63]. Damaged lung tissues would cause platelet activation and thrombi formation, which lead to the consumption of platelets [64]. When leucocyte count increases, they may be associated with bacterial co-infection that aggravates the disease [65,66]. In HD patients, albumin is an indicator of a patient's nutritional status and is related to the malnutrition-inflammation complex syndrome, which is also an important risk factor for cardiovascular mortality [67,68].

Our study has several limitations. All of the included studies were retrospective in design. The included observational studies were subject to potential confounders that may weaken or strengthen the overall results. The included studies had a relatively small sample size and short follow-up time compared with the course of the disease. Data on D-dimer, C-reactive protein, procalcitonin, and interleukin 6 levels were insufficient in the included studies and could not be analyzed. Furthermore, most studies did not provide adequate information regarding the adjusted results of risk factors. Our meta-analysis did not obtain information, such as body mass index, drinking history, and smoking history, which are also potential risk factors for disease severity and mortality. Finally, moderate heterogeneity in the range of symptoms and comorbidities across different studies could be due to demographic differences, statistical methods, follow-up duration, and the risk factors analyzed. Subgroup analysis and sensitivity analysis could only explain the source of heterogeneity to a certain extent. We further used the random-effects model for the meta-analyses that were analyzed in a fixed-effect model to strengthen our study and enhance the reproducibility of the results. The conclusions of this meta-analysis still need to be

verified by more relevant studies with larger sample sizes, more careful design, and more rigorous implementation. Despite these limitations, our meta-analysis has several advantages. First, to the best of our knowledge, this is the first meta-analysis to identify the clinical risk factors for fatal outcomes in HD patients with COVID-19. In addition, the heterogeneity across the studies was mostly low or moderate, which enhanced the reliability of our results.

In conclusion, male patients might have a higher risk of developing severe COVID-19. Comorbidities, such as respiratory diseases could also greatly influence the clinical prognosis of COVID-19. Clinical features, such as fever, dyspnea, cough, and abnormal platelet, leucocyte, and albumin levels could imply eventual death. Our findings will help clinicians identify markers for the detection of high mortality risk in HD patients at an early stage of COVID-19.

Disclosure statement

The authors report no conflict of interest.

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References

- Li LQ, Huang T, Wang YQ, et al. COVID-19 patients' clinical characteristics, discharge rate, and fatality rate of meta-analysis. J Med Virol. 2020;92(6):577–583.
- [2] Wiersinga WJ, Rhodes A, Cheng AC, et al. Pathophysiology, transmission, diagnosis, and treatment of coronavirus disease 2019 (COVID-19): a review. JAMA. 2020;324(8):782–793.
- [3] Ioannou GN, Locke E, Green P, et al. Risk factors for hospitalization, mechanical ventilation, or death among 10 131 US veterans with SARS-CoV-2 infection. JAMA Netw Open. 2020;3(9):e2022310.
- [4] Barek MA, Aziz MA, Islam MS. Impact of age, sex, comorbidities and clinical symptoms on the severity of COVID-19 cases: a meta-analysis with 55 studies and 10014 cases. Heliyon. 2020;6(12):e05684.
- [5] Valeri AM, Robbins-Juarez SY, Stevens JS, et al. Presentation and outcomes of patients with ESKD and COVID-19. J Am Soc Nephrol. 2020;31(7):1409–1415.
- [6] Betjes MG. Immune cell dysfunction and inflammation in end-stage renal disease. Nat Rev Nephrol. 2013;9(5): 255–265.
- [7] Ma Y, Diao B, Lv X, et al. Epidemiological, clinical, and immunological features of a cluster of COVID-19-contracted hemodialysis patients. Kidney Int Rep. 2020; 5(8):1333–1341.

- [8] Tortonese S, Scriabine I, Anjou L, et al. COVID-19 in patients on maintenance dialysis in the Paris region. Kidney Int Rep. 2020;5(9):1535–1544.
- [9] Tomacruz ID, So PN, Pasilan RM, et al. Clinical characteristics and short-term outcomes of chronic dialysis patients admitted for COVID-19 in metro manila, Philippines. Int J Nephrol Renovasc Dis. 2021;14: 41–51.
- [10] Corbett RW, Blakey S, Nitsch D, West London Renal and Transplant Centre, et al. Epidemiology of COVID-19 in an urban dialysis center. J Am Soc Nephrol. 2020;31(8):1815–1823.
- [11] Alberici F, Delbarba E, Manenti C, et al. A report from the Brescia renal COVID task force on the clinical characteristics and short-term outcome of hemodialysis patients with SARS-CoV-2 infection. Kidney Int. 2020; 98(1):20–26.
- [12] Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. J Clin Epidemiol. 2021;134: 178–189.
- [13] Wells GA, Shea B, O'Connell D, et al. The Newcastle-Ottawa scale (NOS) for assessing the quality if nonrandomized studies in meta-analyses. Ottawa, Canada: Dept of epidemiology and community medicine, University of Ottawa; 2021. Available from: http:// www.ohri.ca/programs/clinical_epidemiology/oxford. htm. Accessed on February 1, 2021.
- [14] McPheeters ML, Kripalani S, Peterson NB, et al. Closing the quality gap: revisiting the state of the science (vol. 3: quality improvement interventions to address health disparities). Evid Rep Technol Assess. 2012; 3(208.3):1–475.
- [15] Hayden JA, van der Windt DA, Cartwright JL, et al. Assessing bias in studies of prognostic factors. Ann Intern Med. 2013;158(4):280–286.
- [16] DerSimonian R, Laird N. Meta-analysis in clinical trials. Control Clin Trials. 1986;7(3):177–188.
- [17] Higgins JPT, Thomas J, Chandler J, et al. Cochrane handbook for systematic reviews of interventions version 6.2. In: Page MJ, Welch VA, editors. 2021. Cochrane, 2021. Available from www.training. cochrane.org/handbook.
- [18] Stefan G, Mehedinti AM, Andreiana I, et al. Clinical features and outcome of maintenance hemodialysis patients with COVID-19 from a tertiary nephrology care center in Romania. Ren Fail. 2021;43(1):49–57.
- [19] Creput C, Fumeron C, Toledano D, et al. COVID-19 in patients undergoing hemodialysis: prevalence and asymptomatic screening during a period of high community prevalence in a large Paris center. Kidney Med. 2020;2(6):716–723.e1.
- [20] Zou R, Chen F, Chen D, et al. Clinical characteristics and outcome of hemodialysis patients with COVID-19: a large cohort study in a single Chinese center. Ren Fail. 2020;42(1):950–957.
- [21] Goicoechea M, Sánchez Cámara LA, Macías N, et al. COVID-19: clinical course and outcomes of 36 hemodialysis patients in Spain. Kidney Int. 2020;98(1):27–34.
- [22] Deshpande R, Dash S, Bahadur MM, et al. Study of COVID-19 pandemic in representative dialysis population across Mumbai, India: an observational

multicentric analysis. J Assoc Physicians India. 2020; 68(10):13–17.

- [23] Aydin Bahat K, Parmaksiz E, Sert S. The clinical characteristics and course of COVID-19 in hemodialysis patients. Hemodial Int. 2020;24(4):534–540.
- [24] Mazzoleni L, Ghafari C, Mestrez F, et al. COVID-19 outbreak in a hemodialysis center: a retrospective monocentric case series. Can J Kidney Health Dis. 2020;7: 2054358120944298.
- [25] Seidel M, Hölzer B, Appel H, COVID dialysis working group, et al. Impact of renal disease and comorbidities on mortality in hemodialysis patients with COVID-19: a multicenter experience from Germany. J Nephrol. 2020;33(5):871–874.
- [26] Min Y, Cheng L, Tu C, et al. Clinical characteristics of deceased hemodialysis patients affected by COVID-19 [published online ahead of print, 2021 Jan 2]. Int Urol Nephrol. 2021;53(4):797–796.
- [27] Sipahi S, Dheir H, ToÇoĞlu A, et al. Characteristics and mortality determinants of COVID-19 patients undergoing haemodialysis [published online ahead of print, 2020 Sep 20]. Turk J Med Sci. 2021;51(2):421–427. DOI:10.3906/sag-2006-54.
- [28] Shang W, Li Y, Li H, et al. Correlation between laboratory parameters on admission and outcome of COVID-19 in maintenance hemodialysis patients. Int Urol Nephrol. 2021;53(1):165–169.
- [29] Hendra H, Vajgel G, Antonelou M, et al. Identifying prognostic risk factors for poor outcome following COVID-19 disease among in-Centre haemodialysis patients: role of inflammation and frailty [published online ahead of print, 2021 Jan 30. J Nephrol. 2021; 34(2):315–319.
- [30] Sosa R, Garcia P, Cipriano EO, et al. Coronavirus disease 2019 in patients with end-stage kidney disease on hemodialysis in Guatemala [published online ahead of print, 2021 Jan 29]. Kidney Int Rep. 2021; 6(4):1110–1117. DOI:10.1016/j.ekir.2021.01.028.
- [31] Islam M, Ozturk Y, Koc Y. Clinical outcomes of COVID-19 in hemodialysis patients in the city of zonguldak, Turkey [published online ahead of print, 2021 Jan 15]. Int Urol Nephrol. 2021;53(7):1445–1448.
- [32] Lugon JR, Neves PDMM, Pio-Abreu A, the COVID-19HD-Brazil Investigators, et al. COVID-19HD-Brazil investigators. Evaluation of Central venous catheter and other risk factors for mortality in chronic hemodialysis patients with COVID-19 in Brazil. Int Urol Nephrol. 2021;1–7. [published online ahead of print].
- [33] Turgutalp K, Ozturk S, Arici M, et al. Determinants of mortality in a large group of hemodialysis patients hospitalized for COVID-19. BMC Nephrol. 2021;22(1): 29.
- [34] Ahmed W, Al Obaidli AAK, Joseph P, et al. Outcomes of patients with end stage kidney disease on dialysis with COVID-19 in Abu Dhabi, United Arab Emirates; from PCR to antibody. BMC Nephrol. 2021;22(1):198.
- [35] Can Ö, Bilek G, Sahan S. Risk factors for infection and mortality among hemodialysis patients during COVID-19 pandemic. Int Urol Nephrol. 2021;1–9. [published online ahead of print].
- [36] Medjeral-Thomas NR, Thomson T, Ashby D, et al. Cohort study of outpatient hemodialysis management

strategies for COVID-19 in North-West London. Kidney Int Rep. 2020;5(11):2055–2065.

- [37] Prasad N, Behera MR, Bhatt M, et al. Outcomes of symptomatic coronavirus disease 19 in maintenance hemodialysis patient in India. Semin Dial. 2021;34(5): 360–367.
- [38] Quiroga B, Muñoz Ramos P, Giorgi M, et al. Dynamic assessment of interleukin-6 during hemodialysis and mortality in coronavirus disease-19. Ther Apher Dial. 2021. [published online ahead of print]. DOI:10.1111/ 1744-9987.13626.
- [39] Grasselli G, Zangrillo A, Zanella A, COVID-19 Lombardy ICU Network, et al. Baseline characteristics and outcomes of 1591 patients infected with SARS-CoV-2 admitted to ICUs of the Lombardy region, Italy. JAMA. 2020;323(16):1574–1581.
- [40] Yi Y, Lagniton PNP, Ye S, et al. COVID-19: what has been learned and to be learned about the novel coronavirus disease. Int J Biol Sci. 2020;16(10):1753–1766.
- [41] Madjid M, Safavi-Naeini P, Solomon SD, et al. Potential effects of coronaviruses on the cardiovascular system: a review. JAMA Cardiol. 2020; 5(7):831–840.
- [42] Chen CY, Shao SC, Chen YT, et al. Incidence and clinical impacts of COVID-19 infection in patients with hemodialysis: systematic review and Meta-analysis of 396,062 hemodialysis patients. Healthcare (Basel). 2021;9(1):47.
- [43] Collins AJ, Foley RN, Herzog C, et al. US renal data system 2010 annual data report. Am J Kidney Dis. 2011;57(1):A8–e526.
- [44] Akchurin O, Meza K, Biswas S, et al. COVID-19 in patients with CKD in New York city. Kidney360. 2021; 2(1):63–70.
- [45] Flythe JE, Assimon MM, Tugman MJ, STOP-COVID Investigators, et al. Characteristics and outcomes of individuals with pre-existing kidney disease and COVID-19 admitted to intensive care units in the United States. Am J Kidney Dis. 2021;77(2):190–203.e1.
- [46] Zheng Z, Peng F, Xu B, et al. Risk factors of critical & mortal COVID-19 cases: a systematic literature review and Meta-analysis. J Infect. 2020;81(2):e16–e25.
- [47] Wu C, Chen X, Cai Y, et al. Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in Wuhan, China. JAMA Intern Med. 2020;180(7):934–943.
- [48] Du RH, Liang LR, Yang CQ, et al. Predictors of mortality for patients with COVID-19 pneumonia caused by SARS-CoV-2: a prospective cohort study. Eur Respir J. 2020;55(5):2000524.
- [49] Yang D, Xiao Y, Chen J, et al. COVID-19 and chronic renal disease: clinical characteristics and prognosis. QJM. 2020;113(11):799–805.
- [50] Trujillo H, Caravaca-Fontán F, Sevillano Á, et al. SARS-CoV-2 infection in hospitalized patients with kidney disease. Kidney Int Rep. 2020;5(6):905–909.
- [51] Wang R, Liao C, He H, et al. COVID-19 in hemodialysis patients: a report of 5 cases. Am J Kidney Dis. 2020; 76(1):141–143.
- [52] Xie X, Zhong Z, Zhao W, et al. Chest CT for typical coronavirus disease 2019 (COVID-19) pneumonia: relationship to negative RT-PCR testing. Radiology. 2020; 296(2):E41–E45.

- [53] Zhu J, Ji P, Pang J, et al. Clinical characteristics of 3062 COVID-19 patients: a meta-analysis. J Med Virol. 2020;92(10):1902–1914.
- [54] Lechien JR, Chiesa-Estomba CM, Place S, COVID-19 Task Force of YO-IFOS, et al. Clinical and epidemiological characteristics of 1420 European patients with mild-to-moderate coronavirus disease 2019. J Intern Med. 2020;288(3):335–344.
- [55] Geng MJ, Wang LP, Ren X, et al. Risk factors for developing severe COVID-19 in China: an analysis of disease surveillance data. Infect Dis Poverty. 2021;10(1): 48.
- [56] Ruan Q, Yang K, Wang W, et al. Clinical predictors of mortality due to COVID-19 based on an analysis of data of 150 patients from Wuhan, China. Intensive Care Med. 2020;46(5):846–848.
- [57] Yang X, Yu Y, Xu J, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. Lancet Respir Med. 2020;8(5):475–481.
- [58] Goyal P, Choi JJ, Pinheiro LC, et al. Clinical characteristics of covid-19 in New York city. N Engl J Med. 2020; 382(24):2372–2374.
- [59] Tian W, Jiang W, Yao J, et al. Predictors of mortality in hospitalized COVID-19 patients: a systematic review and meta-analysis. J Med Virol. 2020;92(10): 1875–1883.
- [60] Xie J, Wang Q, Xu Y, et al. Clinical characteristics, laboratory abnormalities and CT findings of COVID-19 patients and risk factors of severe disease: a systematic review and meta-analysis. Ann Palliat Med. 2021; 10(2):1928–1949.
- [61] Henn V, Slupsky JR, Gräfe M, et al. CD40 ligand on activated platelets triggers an inflammatory reaction of endothelial cells. Nature. 1998;391(6667):591–594.
- [62] Fard MB, Fard SB, Ramazi S, et al. Thrombosis in COVID-19 infection: role of platelet activationmediated immunity. Thromb J. 2021;19(1):59.
- [63] Yatim N, Boussier J, Chocron R, et al. Platelet activation in critically ill COVID-19 patients. Ann Intensive Care. 2021;11(1):113.
- [64] Liu Y, Sun W, Guo Y, et al. Association between platelet parameters and mortality in coronavirus disease 2019: retrospective cohort study. Platelets. 2020;31(4): 490–496.
- [65] Liu Y, Du X, Chen J, et al. Neutrophil-to-lymphocyte ratio as an independent risk factor for mortality in hospitalized patients with COVID-19. J Infect. 2020; 81(1):e6–e12.
- [66] Yang AP, Liu JP, Tao WQ, et al. The diagnostic and predictive role of NLR, d-NLR and PLR in COVID-19 patients. Int Immunopharmacol. 2020;84:106504.
- [67] Jagadeswaran D, Indhumathi E, Hemamalini AJ, et al. Inflammation and nutritional status assessment by malnutrition inflammation score and its outcome in pre-dialysis chronic kidney disease patients. Clin Nutr. 2019;38(1):341–347.
- [68] Kalantar-Zadeh K, Kopple JD, Block G, et al. A malnutrition-inflammation score is correlated with morbidity and mortality in maintenance hemodialysis patients. Am J Kidney Dis. 2001;38(6):1251–1263.