

Supplementary Online Content

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eAppendix. Methods

eTable 1. Characteristics of Patient Population

eTable 2. Bivariate Analysis of Most Recent Active Vitamin D Treatment 14 Days Before COVID-19 Test Order and COVID-19 Test Results, Among Patients With Most Recent Vitamin D in Past Year <20 ng/mL

eReference

This supplementary material has been provided by the authors to give readers additional information about their work.

eAppendix. Methods

Chronic condition indicators. Each chronic condition indicator was set equal to 1 if the patient had at least one of a list of ICD-10-CM diagnosis codes included on an administrative/billing record with a discharge date between January 1, 2018 and April 10, 2020. The lists of codes used for the indicators was defined using the HCUP Elixhauser Comorbidity Software.¹ For each condition, we used all ICD-10-CM and DRG codes listed within categories in the Elixhauser file `comformat_icd10_cm_2020_1.sas`, entitled Creation of Format Library for Comorbidity Groups, ICD-10-CM Elixhauser Comorbidity Software, Version 2020.1. The actual ICD-10-CM codes can be found by finding the following category variable names in the file. Hypertension: HTN, HHRWCHF, HHRWHRF, HHRWOHRF, HHRWRF, HRENWOLF, HRENWRF, HTNCX, HTNPREG, HTNWCHF, HTNWOCHF, OHTNPREG, HTNCXDRG, HTNDRG. Diabetes: DM, DMCX, DIABDRG. Chronic pulmonary disease: CHRNLUNG, PULMDRG. Pulmonary circulation disorders: PULMCIRC. Depression: DEPRESS. CKD: RENLFAIL, HHRWCHF, HHRWHRF, HHRWOHRF, HHRWRF, HRENWOLF, RENALDRG, RENFDRG. Liver disease: LIVER. CM_IS: AIDS, METS, TUMOR, ARTH.

eTable 1: Characteristics of Patient Population											
	Full sample		Likely deficient ^a		Uncertain deficiency: increased treatment ^b		Uncertain deficiency: decreased treatment ^c		Likely sufficient ^d		Fisher's exact test for difference
	N	%	N	%	N	%	N	%	N	%	p-value
Number of patients	489	100	124	100	48	100	30	100	287	100	
Age											
years, mean (SD)	49.2 (18.4)		46.0 (18.1)		45.8 (16.4)		50.2 (20.0)		51.1 (18.5)		0.04 (ANOVA)
<50	260	53	77	62	32	67	10	33	141	49	0.01
50-64	122	25	25	20	8	17	14	47	75	26	
65+	107	22	22	18	8	17	6	20	71	25	
Gender											0.27
Female	366	75	93	75	40	83	19	63	214	75	
Male	123	25	31	25	8	17	11	37	73	25	
Race											<0.001
White	158	32	22	18	8	17	8	27	120	42	<0.001
Other than White	331	68	102	82	40	83	22	73	167	58	
Ethnicity											0.53
Hispanic	41	8	8	6	6	13	<5		24	8	
Not Hispanic	448	92	116	94	42	88	27	90	263	92	
Employee status											0.007
UChicago employee	161	33	41	33	18	38	<5		100	35	
Not UChicago employee	328	67	83	67	30	63	28	93	187	65	
Vitamin D level evaluated in past year	489	100	124	100	48	100	30	100	287	100	
Most recent vitamin D<20 ng/ml	172	35	124	100	48	100	0	0	0	0	
Days since most recent vitamin D level (mean)	162		149		174		134		169		0.09 (ANOVA)
Days since most recent vitamin D level (median)	151		117		165		112		161		0.04
Comorbidity indicators											
Hypertension	261	53	65	52	24	50	21	70	151	53	0.30
Diabetes	137	28	30	24	21	44	11	37	75	26	0.04
Chronic pulmonary disease	117	24	34	27	9	18	8	27	66	23	0.62
Pulmonary circulation disorders	20	4	6	5	<5		<5		10	3	0.67
Depression	119	24	37	30	8	17	11	37	63	22	0.08
Chronic kidney disease	116	24	27	22	9	18	12	40	68	24	0.17
Liver disease	56	11	13	10	<5		8	27	31	11	0.09
Comorbidities with immunosuppression	105	21	28	23	8	17	7	23	62	22	0.85
BMI (mean)	29.8		30.0		31.5		28.8		29.5		0.40 (ANOVA)
BMI ≥30 kg/m ²	229	47	58	47	30	63	12	40	129	45	0.13
Most recent active vitamin D treatment before COVID-19 test											<0.001
None	212	43	70	56	10	21	8	27	124	43	<0.001
1-1000 IU D3/Multivitamin	113	23	18	15	10	21	15	50	70	24	0.001
2000 IU D3	60	12	<5		<5		<5		52	18	<0.001
3000+ IU D3	20	4	<5		7	15	<5		8	3	0.004
D2	76	16	27	22	17	35	<5		28	10	<0.001
Calcitriol	8	2	<5		0	0	0	0	5	2	0.85
Test positive COVID-19	71	15	26	21	6	13	<5		35	12	0.15

Frequency counts of less than 5 have been replaced with the notation <5 to reduce the potential to identify members of the study sample.

^a Answer was yes to most recent vitamin D level within 1 year being deficient (<20 ng/mL); dose was stable or decreased after last visit. Vitamin D dose was rank-ordered as follows: calcitriol > 3000+ IU D3 > 2000 IU D3 > D2 > 1-1000 IU D3/multivitamin > no vitamin D.

^bAnswer was yes to most recent vitamin D level within 1 year being deficient (<20 ng/mL); dose was increased after last visit. Vitamin D dose was rank-ordered as follows: calcitriol > 3000+ IU D3 > 2000 IU D3 > D2 > 1-1000 IU D3/multivitamin > no vitamin D.

^cAnswer was no to most recent vitamin D level within 1 year being deficient (<20 ng/mL); dose was decreased after last visit. Vitamin D dose was rank-ordered as follows: calcitriol > 3000+ IU D3 > 2000 IU D3 > D2 > 1-1000 IU D3/multivitamin > no vitamin D.

^dAnswer was no to most recent vitamin D level within 1 year being deficient (<20 ng/mL); dose was stable or increased after last visit. Vitamin D dose was rank-ordered as follows: calcitriol > 3000+ IU D3 > 2000 IU D3 > D2 > 1-1000 IU D3/multivitamin > no vitamin D.

eTable 2. Bivariate analysis of most recent active vitamin D treatment 14 days before COVID-19 test order and COVID-19 test results, among patients with most recent vitamin D in past year <20 ng/ml

Most recent active vitamin D treatment prior to COVID-19 test order	Total patients	COVID-19 positive		COVID-19 negative	
		N	%	N	%
No Vitamin D	80	14	18	66	83
1-1000 IU D3/Multivitamin	28	7	25	21	75
2000 IU D3	7	<5		6	
3000+ IU D3	10	<5		8	
D2	44	7	16	37	84
Calcitriol	<5	<5		<5	
Total	172	32	19	140	81
Fisher's exact test p = 0.83					

Frequency counts of less than 5 have been replaced with the notation <5 to reduce the potential to identify members of the study sample.

eReference

1. Healthcare Cost and Utilization Project (HCUP). Elixhauser Comorbidity Software for ICD-10-CM (beta version). Version 2020 v1. Accessed April 8, 2020. https://www.hcup-us.ahrq.gov/toolssoftware/comorbidityicd10/comorbidity_icd10.jsp