



Severe Vitamin D Deficiency Increases the Incidence, Length of Stay and Hospital Costs in Surgical Intensive Care Unit Patients with Ventilated-Associated Pneumonia

L. Ray Matthews, MD, Assistant Professor of Surgery, Morehouse School of Medicine, Yusuf Ahmed, MD, MPH, Kenneth L. Wilson, MD, Assistant Professor of Surgery, Morehouse School of Medicine, Diane D. Griggs, NP, Clinical Associate, Morehouse School of Medicine, Omar K. Danner, MD, Assistant Professor of Surgery, Morehouse School of Medicine

ABSTRACT

Background:

Vitamin-D deficiency affects immune function in critically-ill patients. This study investigates the impact of vitamin-D deficiency in surgical intensive care unit (SICU) patients with ventilated-associated pneumonia (VAP).

Methods:

We performed a prospective assessment of the vitamin-D status on 191 patients admitted to the SICU between August 2009 and August 2010. Vitamin-D levels were measured by high pressure liquid chromatography (HPLC) and tandem mass spectrometry (Quest Lab). Vitamin D deficiency was defined as follows: severe ≤ 13 ; moderate 14-26; mild 27-39; and normal ≥ 40 ng/ml.

Conclusion:

Severe vitamin-D deficiency increases VAP-incidence, LOS, and total hospital costs in SICU patients. Therefore, vitamin D deficiency should be corrected in critically-ill SICU patients expeditiously.

Background

Vitamin-D deficiency affects immune function in critically-ill patients. This study investigates the impact of vitamin-D deficiency in surgical intensive care unit (SICU) patients with ventilated-associated pneumonia (VAP).

Hypothesis

We hypothesize that severe vitamin-D deficiency increases the incidence, length of stay (LOS), hospital costs, and mortality rate in SICU patients with VAP.

Methods

We performed a prospective assessment of the vitamin-D status on 191 patients admitted to the SICU between August 2009 and August 2010. Vitamin-D levels were measured by high pressure liquid chromatography (HPLC) and tandem mass spectrometry (Quest Lab). Vitamin D deficiency was defined as follows: severe ≤ 13 ; moderate 14-26; mild 27-39; and normal ≥ 40 ng/ml.

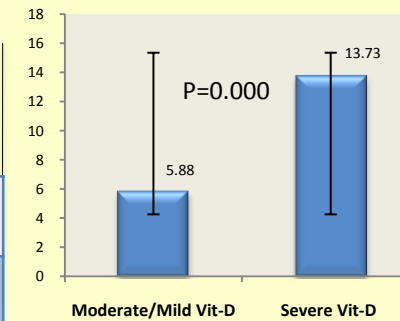
Results

Of the 191 patients, 129 (67.5%) were male, and 62 (32.5%) were female, 118 (61.8%) were African-Americans and 73 (38.2 %) were Caucasian. 62.3% were severe vitamin D deficiency, 29.3% moderate deficiency, and 6.8% mild deficiency. The incidence of VAP in the severe group was 30.3% versus 16 % in the non-severe (moderately & mildly deficiency) group (p value, 0.040). Mean LOS in the SICU for severely deficient group was 13.7 days versus 5.9 days. Average ICU cost was \$68,862.52 for severe group with VAP versus \$31,743.56 (p value, 0.001). Mortality rate for the severe vitamin D deficient group with VAP was 10.9% versus 5.6%, (p value, 0.220), a trend towards higher mortality.

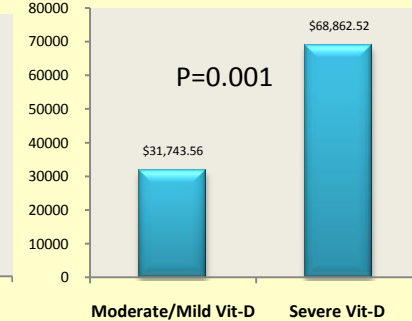
	Severe Vit-D Deficient (N=119)	Moder/Mild Vit-D Deficient (N=72)	P_Value
Male	60.5%	79.2%	0.008
Female	39.5%	20.8%	
Black	72%	44.4%	0.000
White	27.0%	55.6%	
Intubated	54.6%	25.0%	0.005
Pneumonia	30.0%	16.0%	0.04
Mortality	10.9%	5.6%	0.220

	Severe Vit-D Deficient	Moderate/Mild Vit-D Deficient	P_Value
	Mean \pm SEM	Mean \pm SEM	
Age (Years)	47.13 \pm 1.7	46.69 \pm 2.1	NS
Vitamin_D Level(ng/ml)	8.04 \pm 0.28	21.83 \pm 0.97	0.000
Length of ICU Stay	13.73 \pm 0.94	5.88 \pm 1.3	0.000
ICU Cost(\$)	\$52935.44 \pm 7496.352	\$22688.93 \pm 4839.625	0.000
VAP_ICU_Cost (\$)	\$68862.52 \pm 8199.007	\$31743.56 \pm 5345.759	0.001

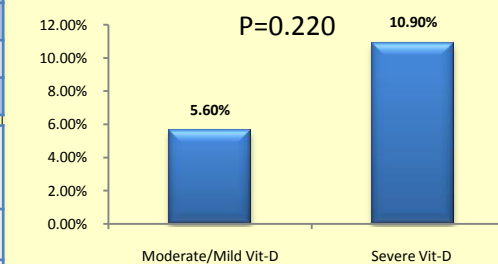
Mean ICU Stay



VAP_ICU_Treatment Cost



Mortality Rate



Conclusion:

Severe vitamin-D deficiency increases VAP-incidence, LOS, and total hospital costs in SICU patients. Therefore, vitamin D deficiency should be corrected in critically-ill SICU patients expeditiously.