

Incidence of chronic obstructive pulmonary disease exacerbations in veterans with comorbid heart failure taking selective versus nonselective beta blockers

Makayla Wiles Nelson, PharmD; Brent Simpkins, PharmD, BCACP; Kristen Wilhite, PharmD Candidate 2021
Lexington VA Health Care System | Lexington, Kentucky



VA U.S. Department of Veterans Affairs

BACKGROUND

- Chronic obstructive pulmonary disease (COPD) is the fifth most prevalent disease within the veteran population and affects approximately 15% of United States Department of Veterans Affairs (VA) users.¹ Veterans with COPD often have a high prevalence of comorbidities and may be prescribed beta blockers to manage chronic cardiac conditions.¹
- Nonselective beta blockers inhibit both beta-1 and beta-2 receptors, theoretically leading to more marked pulmonary and peripheral effects compared to beta-1 selective blockers. As a result, there is a presumed increased risk of bronchospasm associated with nonselective beta blockers in patients with underlying respiratory conditions.²
- In patients with both chronic lung disease and heart failure, the evidence is inconsistent regarding the safety of beta blockers.

OBJECTIVES

- This retrospective cohort study aims to compare the incidence of COPD exacerbations requiring hospitalization in veterans with comorbid heart failure (HF) taking metoprolol versus carvedilol at a single VA Health Care System (HCS).
- Primary Endpoint: Incidence of COPD exacerbations requiring hospitalization
- Secondary Outcomes: Rate of hospital visits for any reason, Rate of emergency room visits for any reason, and all-cause mortality
- We hypothesize there will be an increased incidence of COPD exacerbations requiring hospitalization in veterans taking carvedilol, a nonselective beta blocker, versus metoprolol, a selective beta blocker.

METHODS

- Carvedilol and metoprolol tartrate/succinate were the highest utilized beta blockers within our facility and as a result were selected to represent the nonselective and selective beta blocker cohorts, respectively.
- All veterans at the Lexington VA with a documented diagnosis of both COPD and HF and prescribed carvedilol or metoprolol tartrate/succinate between July 1, 2014 and June 30, 2015 were enrolled in the study.
- Veterans were excluded if they switched from one beta blocker to another, discontinued their beta blocker, or died within the enrollment period.
- Veterans were followed over five years from July 1, 2015 through June 30, 2020 to assess for primary and secondary outcomes
- A local computerized patient record system (CPRS) chart review was utilized to collect patient data for analysis.

STATISTICAL ANALYSIS

- The primary outcome was analyzed utilizing relative risk and associated confidence interval
- Continuous variables were analyzed utilizing an unpaired t-test
- Categorical variables were analyzed utilizing the chi-squared test

RESULTS

636 unique veterans were identified and 132 of those were excluded. As a result, 504 veterans were included in the final analysis, with 174 in the carvedilol cohort and 330 in the metoprolol cohort.

Baseline Characteristics	Carvedilol (n=174)	Metoprolol (n=330)	p-value
Age – yrs. mean (SD)	70.55 (9.10)	72.20 (9.08)	0.0521
Male sex – no. (%)	173 (99.42)	326 (98.79)	0.4924
Race – no. (%)			0.0108
White	153 (87.93)	312 (94.5)	
Black	15 (8.62)	9 (2.73)	
Other	6 (3.45)	9 (2.73)	
Smoking History – no. (%)			0.0291
Current	64 (36.78)	101 (30.60)	
Former	100 (57.47)	212 (64.24)	
Never	19 (10.92)	17 (5.15)	
COPD Medication – no. (%)			
SABA/SAMA	125 (71.84)	241 (73.03)	0.7755
LABA	56 (32.18)	150 (45.45)	0.0040
LAMA	73 (41.95)	122 (36.97)	0.2747
ICS	56 (32.18)	135 (40.91)	0.0549
GOLD Stage – no. (%)			0.9287
I	24 (13.79)	38 (11.52)	
II	58 (33.33)	109 (33.03)	
III	27 (15.52)	50 (15.15)	
IV	9 (5.17)	21 (6.36)	
Unknown	56 (32.18)	112 (33.94)	
Chronic Home Oxygen Use – no. (%)	34 (19.54)	74 (22.42)	0.4531

DISCLOSURES

The authors of this presentation have no conflicts of interest to disclose. The contents of this poster represent the work of the authors and are not intended to represent the views of the Department of Veterans Affairs or of the United States Government.

Outcomes	Carvedilol (n=174)	Metoprolol (n=330)	RR	Significance
Unique patients hospitalized for COPD exacerbation – no. (%)	31 (17.82)	55 (16.67)	1.0690	0.72-1.59
Exacerbation Frequency – no. (%)			N/A	0.2378
0	143 (82.18)	275 (83.33)		
1	14 (8.05)	37 (11.21)		
2	10 (5.75)	8 (2.42)		
3	4 (2.30)	4 (1.21)		
≥4	3 (1.72)	6 (1.82)		
Total hospitalizations for COPD exacerbation – no. (mean)	58 (0.33)	102 (0.31)	N/A	-0.15-0.20
Follow up duration – mos. mean (SD)	42.46 (20.73)	47.44 (21.40)	N/A	0.0124
Total Hospitalizations for any reason – no. (mean)	429 (2.47)	999 (3.03)	N/A	-1.23-0.11
Total ER Visits no. – no. (per pt.)	867 (4.98)	1704 (5.16)	N/A	-1.44-1.07
All-Cause Mortality – no. (%)	104 (59.77)	162 (49.09)	1.2175	1.03-1.43

CONCLUSIONS

- There was no significant difference in the incidence of COPD exacerbations requiring hospitalization between the carvedilol and metoprolol cohort
- There was no significant difference in hospitalization or emergency services for any reason between the two cohorts
- Mortality was significantly higher in the carvedilol cohort compared to metoprolol

LIMITATIONS

- Low number of hospitalizations for COPD exacerbation identified
- Unable to analyze non-VA healthcare service utilization
- Beta blocker adherence was not assessed
- Groups unevenly matched
- Primarily white male patient population

REFERENCES

- Walsh, J. The burden of COPD on veterans and the VA healthcare system. Veterans Enterprise. Published 2014 Jun 3.
- Klabunde, R. E. (2016, January 29). Beta-Adrenoceptor Antagonists (Beta-Blockers). Retrieved November 24, 2020, from <https://www.cvpharmacology.com/cardioinhibitory/beta-blockers>