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Independent Predictors of *Mycoplasma pneumoniae* Infection: A Retrospective Cohort Study Among Hospitalized Adults in an East Texas Health Facility

Menkeoma Laura Okoli [1,*], Ibuchim Chinemerem Okoli [2], Abuoma Chisom Okoli [3], Ikechukwu Umezurike [1] and Celestine Ishiekwene [4]

[1] Department of Internal Medicine, CHRISTUS Health/Texas A&M University, Longview, TX 75601, USA; ikechukwu.umezurike@christushealth.org
[2] Department of Clinical Sciences, All Saints University (SVG), Arnos Vale VC0100, Saint Vincent and the Grenadines; inaconc@yahoo.co.uk
[3] Department of Internal Medicine, Harmony Medical and Wellness Center, Abuja 900108, Nigeria; okoliabuoma1@gmail.com
[4] Department of Infectious Disease, CHRISTUS Health/Texas A&M University, Longview, TX 75601, USA; celestine.ishiekwene@christushealth.org
* Correspondence: drlauraokoli@gmail.com

Abstract

Background: Community-acquired pneumonia in the United States accounts for over five million cases annually, with an estimated one million hospitalizations. About two million of these annual cases and over 100,000 annual hospitalizations are caused by mycoplasma pneumonia. Although mycoplasma can sometimes present as a benign disease, it can cause severe complications, which are referred to as pulmonary and extrapulmonary complications. This study aims to identify independent predictors of *Mycoplasma pneumoniae* infection among adult patients in our facility in East Texas. Methods: This retrospective cohort study used data from the electronic health record (EPIC Systems). Multivariate analyses were conducted to determine variables independently associated with mycoplasma pneumonia. The main outcome variable was the presence of mycoplasma pneumonia as indicated by serology testing. Results: Among 1714 adult patients in our study population who underwent antibody testing, 297 (17.3%) tested positive for mycoplasma pneumonia. Mycoplasma pneumonia was significantly associated with age, sex, race, season, and tobacco use after controlling for other variables. Adults who do not use tobacco had lower odds of having mycoplasma pneumonia compared to adults who are currently using tobacco (OR = 0.64, C.I. = 0.48–0.75). Also, these adults are more likely to have MP during non-respiratory season as compared to respiratory season (OR = 1.25, C.I. = 1.10–1.61). Conclusions: Tobacco use, season, age, race, and sex were all significant predictors of mycoplasma pneumonia. These findings highlight target areas for health care professionals and organizations to tackle to help improve patient health outcomes.

Keywords: mycoplasma; pneumonia; rapid *Mycoplasma pneumoniae* IgM; independent predictors; standardization; diagnostic methods; antibiotic resistance

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1. Introduction

Pneumonia is a major cause of morbidity and mortality globally, with over three million deaths annually [1–3]. It stands as the fourth principal cause of death globally [3–5]. Current data suggests that 12% of global cases of community-acquired pneumonia (CAP)

are attributable to mycoplasma pneumonia (MP) [3–6]. CAP in the United States accounts for over five million cases annually, with an estimated one million hospitalizations [4]. About two million of these annual cases and over 100,000 annual hospitalizations are caused by MP [1–13].

Mycoplasma pneumonia is caused by an infection with a bacterium, *Mycoplasma pneumoniae* organism. Transmission of infection is via respiratory droplets [4,13–15]. Infection typically manifests as upper and lower respiratory tract infections [4–6], presenting with clinical symptoms such as fever, pharyngitis, rhinorrhea, wheezing, difficulty in breathing, and persistent cough [1,3,5]. Reports from various studies suggest that while mycoplasma can sometimes present as a benign disease [1,13–15], it can cause serious complications, which have been referred to as pulmonary and extrapulmonary complications [1,15,16]. Severe pulmonary disease occurs with an inadequate response to first-line treatment leading to intractable pneumonia infection, which ultimately results in lung atelectasis, consolidation, and bronchiolitis obliterans [15,17].

Extrapulmonary complications have been shown to affect multiple organ systems, including the nervous system manifesting as meningitis, encephalitis, and stroke; cardiovascular system (pericarditis, arrhythmia, cardiac thrombosis); renal (glomerulonephritis); dermatology (erythema nodosum, Stevens–Johnson syndrome); and hematological disorder presenting as hemolysis [1,3,6,7,11,13,14]. Complications from MP contributes to increased health and economic burden, owing to increased health care expenditure and reduced manpower in the workforce [6,15]. In addition, studies have implicated MP as an aggravating factor in the progression of other pulmonary pathologies such as COPD, bronchitis, asthma, and cystic fibrosis [1,3,6,18,19].

Several studies have examined the relationship between MP and factors such as weather, smoking, diabetes, coronary artery disease (CAD), and heart disease. Studies have shown that various pneumonia causative organisms show seasonal differences as MP and other atypical pathogens have a greater likelihood of occurrence in the summer and fall seasons [6,10,13,20]. Respiratory viruses, Streptococcus pneumonia, and Hemophilus influenza have a greater predilection for occurrence during winter periods [1,10,13,20]. However, the occurrence of MP throughout the year is not uncommon [1,10,13]. Also, studies have shown increasing prevalence of MP in patients with chronic kidney disease, CAD, diabetes, heart disease, and ischemic stroke [14,21–25].

Given the increasing prevalence of hospital admissions due to MP in our facility, the need to examine factors that could be associated with this infection become necessary. This study builds upon existing literature to further identify independent predictors of MP among adult patients. Also, this study aims to recognize target areas that could be improved upon by health care practitioners to optimize patient health outcomes.

2. Methods

2.1. Study Design and Data Source

This is a retrospective cohort study of patients admitted to a 425-bed, university-affiliated medical center in Longview, Texas (CHRISTUS Good Shepherd) between May 2022 and April 2023. Primary data on patients who underwent serology testing (Rapid *Mycoplasma pneumoniae*, Ab, IgM) between this period was obtained. The IgM testing was utilized for this study as this is the only testing method available in our facility. Primary data contained information on mycoplasma testing among patients aged 0–99 years. This primary data file was then used to obtain de-identified information on study variables from the electronic health record -Epic MyChart (Epic Systems, 2025).

2.2. Detection of Mycoplasma pneumoniae Infection

The detection of mycoplasma pneumonia cases for our study cohort was performed using a rapid qualitative test—Immunocard Mycoplasma. This test detects *Mycoplasma pneumoniae* IgM antibodies in the serum. Immunocard Mycoplasma test kit is manufactured by Meridian Bioscience and has a sensitivity and a specificity rate of 88% and 90%, respectively.

2.3. Study Population

The sample population included 2976 patients between the ages of 0 and 99 years. This analysis was limited to adult patients between the ages of 18 and 99 years with and without MP. Patient data with missing information on any study variable, as well as a positive culture test suggestive of polymicrobial pneumonia infection, were excluded. Also, patients with normal chest X-ray, duplicate data, as well as data on patients less than 18 years, were excluded from this study (Table 1). The final study population comprised 1714 patients aged 18–99 years with and without MP (Figure 1).

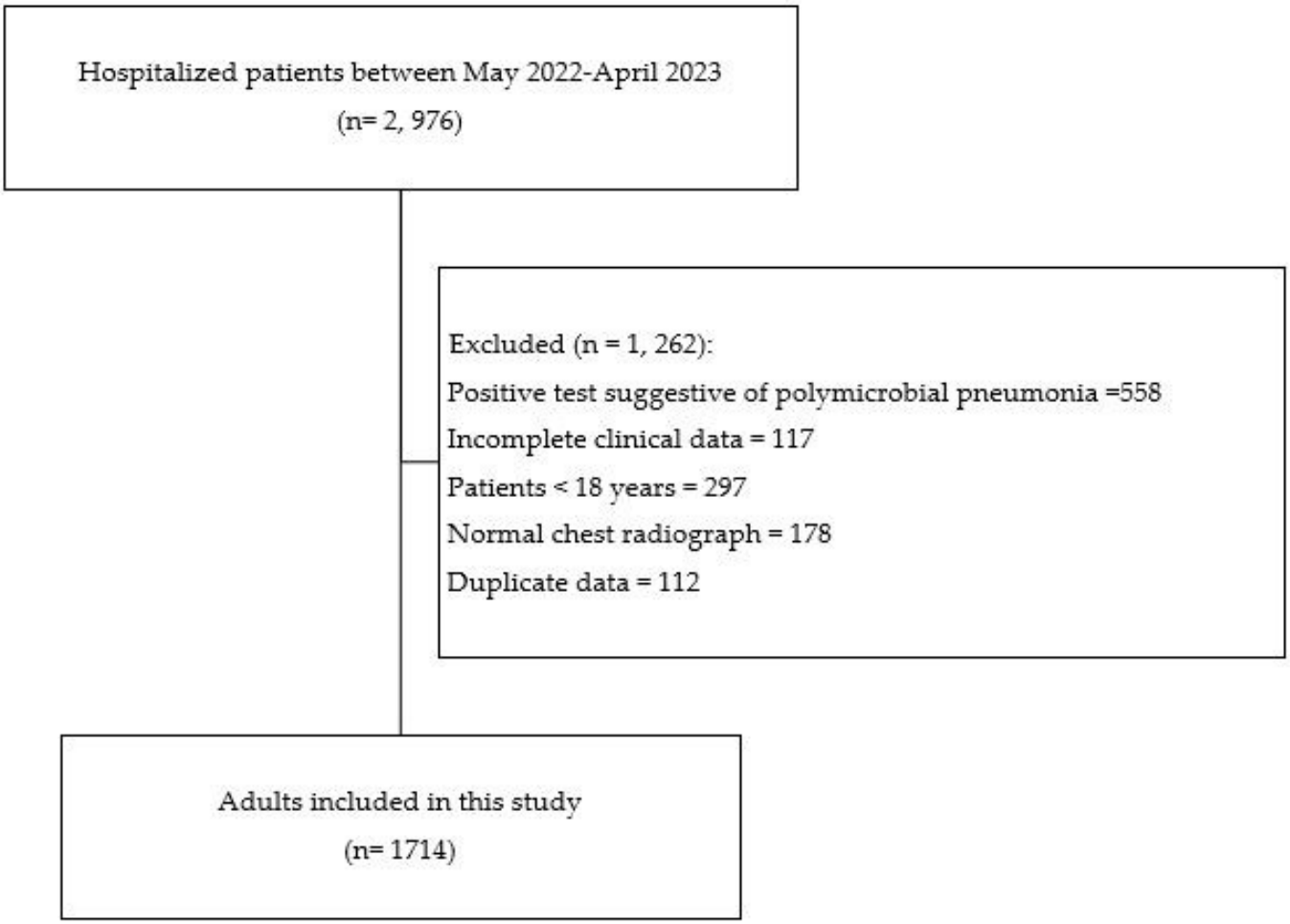


Figure 1. Flow chart of patient selection and enrollment.

Table 1. Inclusion and exclusion criteria of study.

Inclusion	Exclusion
- Age ≥ 18 years	- Evidence of polymicrobial pneumonia
- Hospitalized patients with MP based on serology, chest radiography, and clinical findings	- Normal chest X-ray pattern
- Hospitalized patients without MP	

MP = Mycoplasma pneumonia.

2.4. Study Variables

The outcome variable for this analysis was the presence of mycoplasma pneumonia (MP) classified as positive or negative (Table 2). *Mycoplasma pneumoniae* infection was defined by (1) presence of acute respiratory symptoms such as cough, fever, and shortness of breath, (2) positive mycoplasma serology testing—rapid *Mycoplasma pneumoniae*, Ab, IgM—and (3) radiologist-confirmed chest X-ray findings of patchy areas of interstitial infiltrates or consolidation. Only patients who met all three criteria were included in this study. Other variables include demographic information such as age, grouped as (18–34 years—young adults, 35–54 years—middle-aged adults, 55–64 years—mature adults, 65–79 years—older adults, 80–99 years—very elderly), sex categorized as male or female, and race/ethnicity categorized as Asian, Hispanic, White non-Hispanic, and Black non-Hispanic.

Table 2. Baseline and clinical characteristics of *Mycoplasma pneumoniae* infection in East Texas adult population (2022–2023).

	Total	**Mycoplasma Pneumonia Positive**	**Mycoplasma Pneumonia Negative**	
Variables	(*n* = 1714) N (%)	(*n* = 297) N (%)	(*n* = 1417) N (%)	*p*-value
Race				0.0013
White non-Hispanic	1294 (75.50)	199 (67.00)	1095 (77.28)	
Hispanics	88 (5.13)	24 (8.08)	64 (4.52)	
Black non-Hispanic	324 (18.90)	73 (24.58)	251 (17.71)	
Asian	8 (0.47)	1 (0.34)	7 (0.49)	
Sex				0.0127
Male	805 (46.97)	120 (40.40)	685 (48.34)	
Female	909 (53.03)	177 (59.60)	732 (51.66)	
Age				<0.0001
18–34 years	82 (4.78)	33 (11.11)	49 (3.46)	
35–54 years	294 (17.15)	69 (23.23)	225 (15.88)	
55–64 years	364 (21.24)	60 (20.20)	304 (21.45)	
65–79 years	638 (37.22)	100 (33.67)	538 (37.97)	
80–99 years	336 (19.60)	35 (11.78)	301 (21.24)	
Season				0.0652
Respiratory season	975 (56.88)	156 (52.53)	819 (57.80)	
Non-respiratory season	739 (43.12)	141 (47.47)	598 (42.20)	
Asthma				0.2555
Present	362 (21.12)	70 (23.57)	292 (20.61)	
Absent	1352 (78.88)	227 (76.43)	1125 (79.39)	
Cancer				0.7153
Present	118 (6.88)	19 (6.40)	99 (6.99)	
Absent	1596 (93.12)	278 (93.60)	1318 (93.01)	

Table 2. *Cont.*

	Total	Mycoplasma Pneumonia Positive	Mycoplasma Pneumonia Negative	
Tobacco use				0.0275
Current user	486 (28.35)	88 (29.63)	398 (28.09)	
Former user	584 (34.07)	96 (32.32)	488(34.44)	
Non-user	644 (37.57)	113 (38.05)	531 (37.47)	
Stroke				0.4519
Present	303 (17.68)	57 (19.19)	246 (17.36)	
Absent	1411 (82.32)	240 (80.81)	1171 (82.64)	
Coronary artery disease				0.0068
Present	504 (29.40)	68 (22.90)	436 (30.77)	
Absent	1210 (70.60)	229 (77.10)	981 (69.23)	
Chronic kidney disease				0.2402
Present	593 (34.60)	94 (31.65)	499 (35.22)	
Absent	1121 (65.40)	203 (68.35)	918 (64.78)	
Chronic obstructive pulmonary disease				0.2041
Present	802 (46.79)	136 (45.79)	666 (47.00)	
Absent	912 (53.21)	161 (54.21)	751 (53.00)	
Diabetes				0.6396
Present	667 (38.91)	112 (37.71)	555 (39.17)	
Absent	1047 (61.09)	185 (62.29)	862 (60.83)	
Heart Failure				0.3744
Present	709 (41.37)	116 (39.06)	593 (41.85)	
Absent	1005 (58.63)	181 (60.94)	824 (58.15)	
Hyperlipidemia				0.0016
Present	1155 (67.39)	177 (59.60)	978 (69.02)	
Absent	559 (32.61)	120 (40.40)	439 (30.98)	
Hypertension				<0.0001
Present	1416 (82.61)	221 (74.41)	1195 (84.33)	
Absent	298 (17.39)	76 (25.59)	222 (15.67)	

Counts and percentages represent unweighted frequencies and percentages of the study population. *p*-value is derived from the Pearson Chi-Square test.

Information on co-morbid health conditions were collected, including diabetes, CAD, cancer, hyperlipidemia, stroke, hypertension, asthma, chronic kidney disease, COPD, and heart failure; these were classified as present/absent. For each of these variables, "present" indicates the presence of the condition in the patient's medical chart prior to the diagnosis of mycoplasma pneumonia. Information on seasonality, classified as respiratory season—early October to early May, non-respiratory season—early May to early October [20], and tobacco use classified as current, former, and non-user were included in this analysis.

2.5. Ethical Approval

The study protocol was reviewed and approved by the CHRISTUS Health Institutional Review Board (IRB no: CH-2024-014). Informed consent was not required for this study given its retrospective nature. Study methods were carried out in accordance with the relevant CRISTUS Health regulations and guidelines.

2.6. Statistical Analysis

The characteristics of the population studied were examined using unweighted frequencies and percentages. Differences in the independent predictors between adults with and without mycoplasma pneumonia (MP) were assessed using Pearson Chi-Square ($\chi 2$) test. Crude odd ratios were obtained by analyzing each variable with the variable-dependent positive mycoplasma test (mycoplasma pneumonia) using unweighted logistic

regression. All independent variables—season, tobacco use, age, sex, race, and co-morbid conditions such as asthma, cancer, stroke, coronary artery disease, chronic kidney disease, COPD, diabetes, heart failure, hyperlipidemia, and hypertension—were included in a multiple logistic regression model to assess for variables independently associated with MP to obtain corresponding odd ratios and 95% confidence intervals. All analysis was conducted using SAS version 9.4 (Cary, NC, USA). A p-value of <0.05 was considered statistically significant. In addition, multicollinearity testing was performed to ascertain if the predictor variables are correlated using the VIF option in SAS 9.4.

3. Results

3.1. Baseline and Clinical Characteristics of Mycoplasma pneumoniae Infection

The study population consisted of 1714 patients who underwent rapid mycoplasma antibody testing aged 18–99 years. From this population, 297 (17.3%) tested positive for mycoplasma pneumonia (Table 2). More than half of these adults were of female gender (53%). Most of the adults were White non-Hispanic (75.5%), followed by Black non-Hispanic (18.9%) and Hispanics (5.1%). About 0.5% of these adults were of Asian race. With respect to the age group, about 20% were in the 80–99 years age group, 37.2% were in the 65–79 years group, 21% were in the 55–64 years age group, 17% were in the 35–54 years age group, and 5% were in the 18–34 years age group. Approximately 57% of these patients were admitted during the respiratory season. Most of these adults did not have asthma (79%). In addition, more than half of these adults did not have cancer (93%), stroke (82%), or coronary artery disease (71%).

In terms of tobacco use, 28% are current users, 34% are former users, and 38% do not use tobacco. About 34.6% of these adults had chronic kidney disease, while 46.8% had COPD. More than half of the adults had hypertension (83%) and hyperlipidemia (67%). About 39% of adults had diabetes and 41% had heart failure.

Table 2 describes the distribution of variable characteristics across study groups. Statistically significant differences were found to exist in the proportion of these characteristics including sex, age, race, tobacco use, coronary artery disease, hypertension, and hyperlipidemia. Among adults who tested positive for mycoplasma, 59.6% are females compared to 51.6% who tested negative (p = 0.0127). Approximately 11% of adults in the age category of 18–34 years are positive (MPP), compared to 3% who were mycoplasma pneumonia-negative (MPN) ($p \leq 0.0001$). Most MPP adults (67%) are White non-Hispanic compared to 77.3% who are MPN (p = 0.0013). Among MPP adults, 29.6% are currently using tobacco compared to 28% who are MPN; similarly, 32% of MPP adults are former tobacco users compared to 34.4% of MPN adults (p = 0.0275).

Majority of adults who are MPP (77.1%) did not have coronary artery disease compared to 69.2% who are MPN (p = 0.0068). For adults who are MPP, more than half (60%) had hyperlipidemia compared to 69% of MPN adults (p = 0.0016). Majority of MPP adults (74.4%) had hypertension compared to 84.3% of MPN adults ($p \leq 0.0001$).

3.2. Regression Analysis of Factors Associated with Mycoplasma pneumoniae Infection

Table 3 illustrates the crude and adjusted odd ratios of the association between these independent variables and mycoplasma pneumonia (MP) in East Texas adults. Age, sex, race, season, and tobacco use were found to be significant predictors of MP in the adjusted model.

Table 3. Regression analysis of factors associated with *Mycoplasma pneumoniae* infection in the East Texas adult population (2022–2023).

Variables	COR (95% CI)	AOR (95% CI)
Race		
Hispanics	2.06 (1.26–3.38)	1.60 (1.13–2.74)
Black non-Hispanic	1.60 (1.18–2.16)	1.50 (1.09–2.08)
Asian	0.80 (0.10–6.42)	0.69 (0.08–6.34)
White non-Hispanic	Reference	Reference
Sex		
Male	0.73 (0.56–0.93)	0.69 (0.52–0.89)
Female	Reference	Reference
Age		
18–34 years	Reference	Reference
35–54 years	0.46 (0.27–0.76)	0.51 (0.29–0.89)
55–64 years	0.29 (0.17–0.49)	0.32 (0.17–0.60)
65–79 years	0.28 (0.17–0.45)	0.32 (0.17–0.57)
80–99 years	0.17 (0.10–0.30)	0.20 (0.10–0.40)
Season		
Non-respiratory season	1.24 (1.19–1.60)	1.25 (1.10–1.61)
Respiratory season	Reference	Reference
Asthma		
Present	1.19 (0.88–1.50)	1.03 (0.75–1.41)
Absent	Reference	Reference
Cancer		
Present	1.00 (0.55–1.51)	1.01 (0.60–1.70)
Absent	Reference	Reference
Tobacco use		
Non-user	0.78 (0.38–0.72)	0.64 (0.48–0.75)
Former	0.89 (0.64- 0.88)	0.72 (0.69–0.85)
Current	Reference	Reference
Stroke		
Present	1.13 (0.82–1.37)	1.40 (0.99–1.95)
Absent	Reference	Reference
Coronary artery disease		
Present	0.67 (0.50–0.87)	0.83 (0.60–1.16)
Absent	Reference	Reference
Chronic kidney disease		
Present	0.90 (0.65–1.11)	1.02 (0.75–1.39)
Absent	Reference	Reference
Chronic obstructive pulmonary disease		
Present	1.05 (0.93–1.22)	1.25 (0.95–1.45)
Absent	Reference	Reference
Diabetes		
Present	1.00 (0.72–1.21)	1.07 (0.81–1.44)
Absent	Reference	Reference
Heart failure		
Present	0.90 (0.69–1.15)	1.06 (0.79–1.43)
Absent	Reference	Reference
Hyperlipidemia		
Present	0.66 (0.51–0.86)	0.87 (0.64–1.18)
Absent	Reference	Reference
Hypertension		
Present	0.54 (0.40–0.72)	0.74 (0.51–1.08)
Absent	Reference	Reference

CI = Confidence Interval, COR = Crude Odds Ratio, AOR = Adjusted Odds Ratio.

In this analysis, Hispanic adults are 2.06 times more likely to have MP compared to White non-Hispanic adults (OR = 2.06, C.I. = 1.26–3.38). This effect remained after controlling for other variables in the multivariate analysis (OR = 1.60, C.I. = 1.13–2.74). Although Asian adults had 20% lower odds of having MP compared to White non-Hispanics, this association was not statistically significant (OR = 0.80, C.I. = 0.10–6.42), even after controlling for other variables (OR = 0.69, C.I. = 0.08–6.34). In the bivariate analyses, male adults had 27% lower odds of having MP compared to females (OR = 0.73, C.I. = 0.56–0.93), this effect persisted after controlling for other variables (OR = 0.69, C.I. = 0.52–0.89). Additionally, adults in the age category of 80–99 years had 83% lower odds of having MP compared to young adults in the 18–34 years age category (OR = 0.17, C.I. = 0.10–0.30); this association was sustained after controlling for other variables (OR = 0.20, C.I. = 0.10–0.40).

Furthermore, these adults are 1.24 times more likely to have MP during a non-respiratory season as compared to respiratory season (OR = 1.24, C.I. = 1.19–1.60). This association remained after adjusting for other variables (OR = 1.25, C.I. = 1.10–1.61). Also, adults who do not use tobacco had 22% lower odds of having MP compared to adults who are currently using tobacco (OR = 0.78, C.I. = 0.38–0.72). This association persisted after controlling other variables (OR = 0.64, C.I. = 0.48–0.75). Also, hypertensive adults had 46% lower odds of having MP compared to adults without hypertension (OR = 0.54, C.I. = 0.40–0.72). However, this association was substantially diminished after controlling other variables (OR = 0.74, C.I. = 0.51–1.08). Furthermore, the Variance Inflation Factors (VIFs) for all the predictor variables (co-morbid conditions) had a value less than five (5), indicating no multicollinearity among these variables (Table S1) [26].

4. Discussion

The objective of this study was to identify independent predictors of *Mycoplasma pneumoniae* infection in our facility in East Texas. Results from this study showed age, sex, race, season, and tobacco use to be significantly associated with mycoplasma pneumonia (MP). Consistent with findings from the literature, we found that adults who are currently using tobacco are more likely to have MP compared to non-users. It has been well documented in studies that smoking enables infection via epithelial damage in cases where microorganisms have already migrated from the upper respiratory system to the lower respiratory system [2,27]. Smoking, in combination with MP, serves to cause increased oxidative stress to the lung due to reduction in glutathione levels—a primary antioxidant in the lining of the airways [28–32]. Also, smoking serves as a precursor for the development of chronic lung diseases including COPD [1,2,27–29]. Results from a study showed that the persistence of *Mycoplasma pneumoniae* in circulating white blood cells is a mediating factor for chronic lung inflammation, and this inflammation is further potentiated with tobacco use [23].

Also, this study found that *Mycoplasma pneumoniae* infection was more likely to occur in the non-respiratory season—early May to early October—than in the respiratory season—early October to early May. This finding is in keeping with the literature [10,20,33], as studies have shown a rising trend in the prevalence of MP cases with increasing humidity and temperature [10,20]. The role of seasonality as it relates to MP provides the basis for heightened public health intervention efforts in terms of educational campaigns, which is aimed at addressing suboptimal health practices and reducing disease transmission [10].

Another important finding is that Hispanics and Black non-Hispanics were more likely to have MP compared to White non-Hispanics. This finding is supported by studies that have provided evidence to the disparity observed between racial groups, as Black non-Hispanics and Hispanics had lower rates of receiving preventive vaccinations such as pneumococcal and influenza vaccines [34–36]. Additionally, socioeconomic and sociode-

mographic factors including educational level, availability of good jobs, and lack of access to affordable health care services further perpetuate these disparities across racial groups. These disparities result in increased mortality in these groups compared to non-Hispanic Whites [23,34,36].

Findings from this study showed both age and sex as predictors of MP. Younger adults were more likely to have MP compared to older adults. Also, female adults were more likely to have MP compared to male adults. This finding of increased prevalence of MP in younger adults as well as in those of female sex is consistent with other studies. These studies have shown differences with respect to age and sex in MP, compared to other etiologies of CAP which commonly occurs in older male adults [11,12,17,20,35,37,38].

The absence of standardized diagnostic tests across various hospitals in the United States remains a challenge in terms of MP diagnosis [28]. Although various advances have been made in the diagnosis of MP with the introduction of polymerase chain reaction (PCR) testing [1,2,11,20,31,38], diagnosis is still controversial due to limited availability of this testing method across hospitals in the United States [1–3]. Rapid tests such as serology (antibody testing) have been documented as a more readily available diagnostic testing method. The lack of specificity for serology testing has been a limiting factor to its reliability [1,2,11,31]. PCR is considered a superior test to serology as it is highly specific, reliable, and is particularly important in immuno-compromised patients who cannot produce antibodies [1,3,20,31,38]. While tertiary hospital centers now routinely use PCR in MP diagnosis, community hospitals, like our facility, still rely on serology as a major diagnostic testing method [1,2,20,31]. Nevertheless, the diagnosis of MP can be made with a single-titer antibody (IgM) testing [11]. However, a reliable serology test is defined as a four-fold increase in antibody titer levels over a period of onset of symptoms or a rise greater than 1:32 between the paired acute and convalescent blood serum, given its increased specificity and sensitivity of 92% and 95% respectively [1,6,7,11,16,28].

While the clinical course of MP is benign in some cases, it can lead to severe pulmonary (lung atelectasis, consolidation, and bronchiolitis obliterans) [15,17] and extrapulmonary (encephalitis, stroke, arrhythmias, glomerulonephritis, Stevens–Johnson syndrome, hemolysis) diseases [1,3,6,7,11,13,14]. Also, there have been reports of severe cases of MP requiring ICU admission and frequent disease outbreaks occurring in large facility or community settings [15,33,37,38]. The principal medications used for MP treatment as atypical bacteria are fluoroquinolones and macrolides [3,28,31]. The emergence of antibiotic-resistant MP due to medication overuse and misuse presents a serious threat to the management of MP and associated chronic lung conditions [1,3,28,31,37]. In addition, medication side effects including alteration of the respiratory epithelial microbiome or gastrointestinal disease, as in clostridium difficile, are challenging issues with MP treatment [31]. Therefore, efforts at prevention must be maximized.

Various strategies, such as vaccination, hand hygiene, use of face masks, smoking cessation including limiting exposure to passive tobacco smoking, are recommended measures in tackling the increasing prevalence of MP [1,3,28,31,39]. These strategies are presented as areas that health care professionals can integrate into their clinical practice during counseling sessions in the management of MP patients. Supportive care in the form of symptom management is also a necessary component in the overall management of patients with MP. These may include adequate fluid intake to avoid dehydration, rest, diet management, use of breathing treatments, mucolytics, antitussive agents, analgesics, and pulmonary rehabilitation [37]. Also, adequate management of co-morbid conditions in patients with MP play an integral role in achieving comprehensive health outcomes. The development of health care policy aimed at encouraging standardization of MP diagnostic testing across all hospital facilities is paramount in ensuring accurate and timely diagnosis.

Several limitations exist for this study including the limited external validity as it was conducted in a single medical facility. Additionally, this study was conducted using only data on hospitalized patients and did not factor in patients treated in outpatient centers. Likewise, the use of serology tests as a diagnostic tool for MP is a limitation as studies have shown that positive IgM titer can be detected even months, and sometimes years after an initial infection [6,7,28]. Therefore, it is possible that the increasing prevalence of MP in our facility could be attributable to false positives as it may not indicate an active or current infection. Hence, MP cases could have been over- or underestimated especially if antibiotics had already been administered prior to testing. However, the combination of clinical and radiologic findings, in addition to serology, provides a reliable basis for our study results.

Future studies may consider placing attention on policies that emphasizes the standardization of diagnostic tests across hospitals in the United States. These policies should also focus on the development of mycoplasma pneumonia vaccines. The development and implementation of these policies will help maximize health care resources. In addition, these policies will address challenges with respect to inappropriate antibiotic use and medication side effects in accordance with antibiotic stewardship guidelines.

5. Conclusions

Tobacco use, season, age, race, and sex were significant predictors of *Mycoplasma pneumoniae* infection. These findings highlight target areas for health care professionals and organizations to tackle to help mitigate complications from MP. Adequate management of these patients involves a combination of treatment and counseling on prevention strategies, in keeping with the 2019 CAP recommendations of the Infectious Diseases Society of America/American Thoracic Society (IDSA/ATS).

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/jor5030013/s1, Table S1: Multicollinearity analysis of factors associated with *Mycoplasma pneumoniae* infection in East Texas adult population (2022–2023).

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Abbreviations

Mycoplasma pneumonia (MP); Mycoplasma pneumonia-positive (MPP); Mycoplasma pneumonia-negative (MPN); Community-acquired pneumonia (CAP); Chronic obstructive pulmonary disease (COPD); Polymerase chain reaction (PCR); Coronary artery disease (CAD).

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