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Community-Acquired Pneumonia in Adults: A Serious Challenge CME

Federico Martín-Torres, MD, PhD; Antoni Torres, MD, PhD

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Introduction

Federico Martín-Torres, MD, PhD: Hello, I'm Dr Federico Martín-Torres, the host of Pneumonia Television on Medscape. Welcome to our first episode, which explores the serious challenge of community-acquired pneumonia (CAP) in adults. In this episode, we will look at the burden of this disease -- which is both common and serious -- yet preventable in so many cases.

According to the 2010 Global Burden of Disease Study, lower respiratory tract infections -- predominantly **pneumonia** -- are the **fourth** most common cause of **death globally**.^[1,2] Only **heart** disease, **stroke**, and chronic obstructive pulmonary disease (**COPD**) result in a **greater** number of **deaths**. As you will hear in this program, however, even among adult patients who **survive** CAP, there is a significant **impact** on their **quality** of life.

In this program, I spoke to Professor Antoni **Torres** from the Hospital Clinic of **Barcelona**, about the impact of CAP in adults.

Clinical Description of Pneumonia

Dr Martín-Torres: Hello Antoni.

Antoni Torres, MD, PhD: Hello Federico.

Dr Martín-Torres: Pneumonia can be categorized according to the source of the infection as either community-acquired pneumonia -- also known as CAP -- or nosocomial, or hospital-acquired pneumonia. Is it accurate to say that CAP is by far the biggest public health challenge that doctors face?

Prof Torres: Yes, that's absolutely correct. The vast majority of cases of **CAP** are **caused** by **colonization** of **nasopharyngeal** and **oropharyngeal mucosa** by microorganisms such as **pneumococcus**, **Staphylococcus aureus** (*S. aureus*), and Gram-negative bacteria, followed by **aspiration** to the lower airway. A secondary cause of pneumonia is inhalation of **aerosols**, including **Legionella**, **viruses**, and **atypical** pathogens.

Dr Martín-Torres: What happens when bacteria such as pneumococcus enter the lower respiratory tract?

Prof Torres: These microorganisms enter the alveoli, where they begin to grow in the rich environment

provided by the lung, triggering an inflammatory response. A cascade of events then results in accumulation of microorganisms, immune cells, and serum components within the alveoli. As the infected alveoli fill up, neighboring alveoli become affected. Gradually, certain products made by the microorganism -- such as endotoxins and cell wall fragments -- are spread beyond the lungs and exert systemic effects throughout the body.

Dr Martín-Torres: Do you think that CAP can be compared to a heart attack -- and described as a "lung attack," if you will -- in terms of the seriousness with which physicians and patients should view it?

Prof Torres: Yes, Federico, I think that it is an appropriate comparison. Pneumonia is a significant medical event, and I think that with respect to the urgency, mortality, and long-term consequences, it should be viewed as a medical emergency that is on par with a myocardial infarction or stroke.

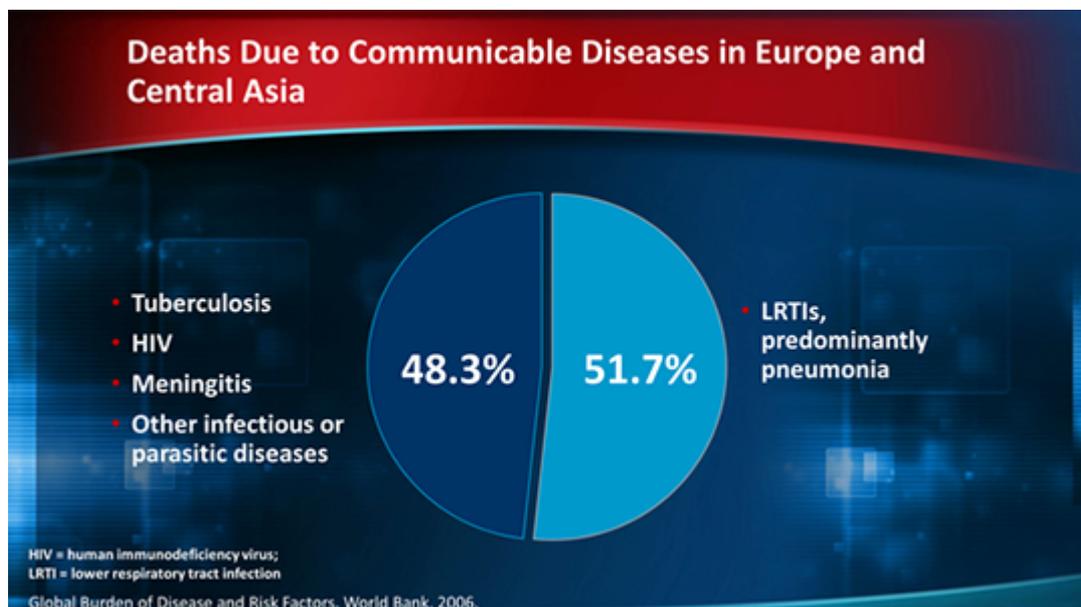
Dr Martín-Torres: What makes CAP such a serious disease?

Prof Torres: There are two consequences in particular that can make the situation very serious. First, the alveoli fill up with fluid containing mucus, immune cells, etc., and the ability of the lungs to carry out air exchange becomes compromised; the patient can literally drown in their own fluids. In addition, the entry of bacterial products into the blood can further increase fever, and result in septic shock and multiorgan failure.

Epidemiology and Burden of Disease

Dr Martín-Torres: There is no doubt that CAP is a global healthcare challenge. This disease accounts for 7% of deaths worldwide, and around 1 in 4 deaths due to infectious and parasitic diseases is caused by pneumonia.^[3] Much of the morbidity and mortality, of course, occurs in infants. To get a sense of the scale of the challenge in adults, I decided to focus our discussion on just one region of the world where there are a lot of good data.

Dr Martín-Torres: If we look at Europe, Antoni, where you have been at the forefront of exploring the burden of CAP, what is the prevalence of this disease in that region?

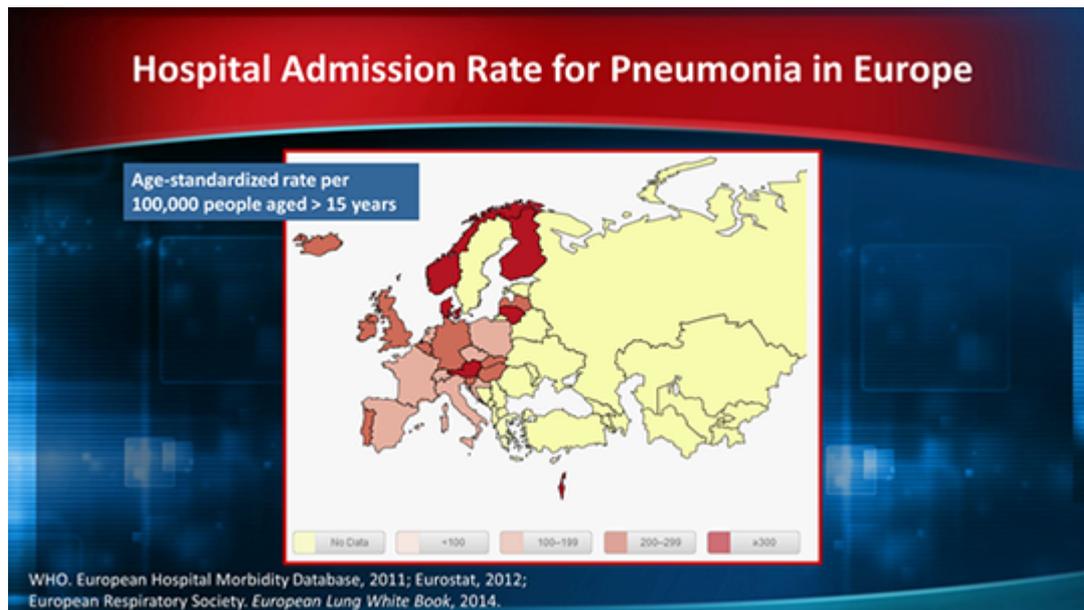


Slide 1.

Prof Torres: The WHO clusters Europe and Central Asia together, and data for that region show that lower respiratory tract infections (LRTIs) -- essentially pneumonia -- account for approximately 1.5% of all deaths in persons over the age of 45.^[3] Pneumonia also accounts for more than half of all deaths due to communicable

diseases in this age group. The importance of this prevalence is even greater in the elderly population.

Dr Martín-Torres: So what does the geographic distribution of CAP in adults look like in Europe?



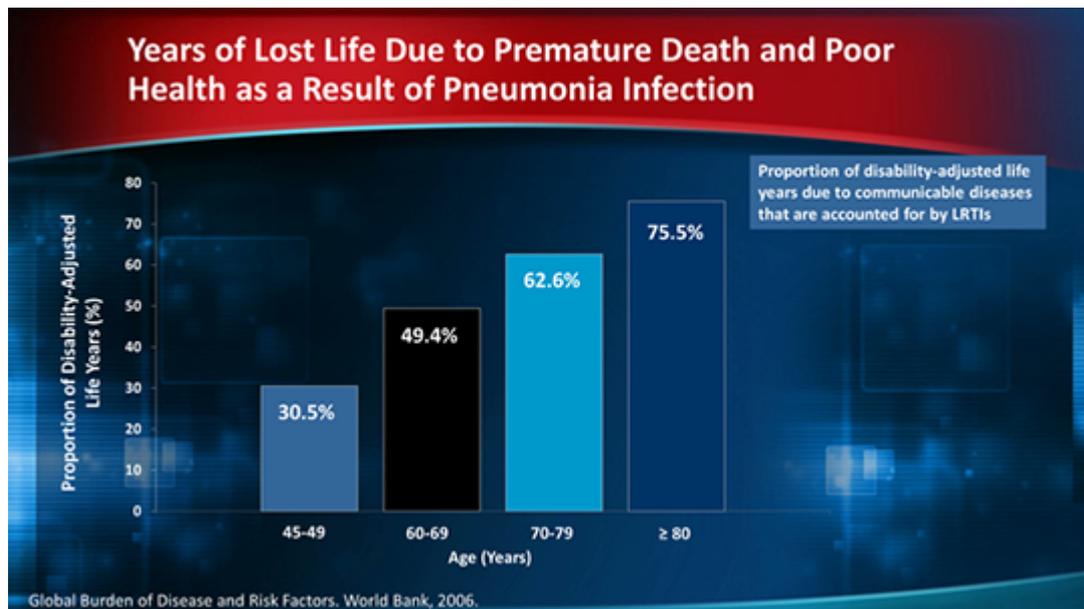
Slide 2.

Prof Torres: Current data from the WHO and Eurostat show that the highest rates of hospital admission for CAP in Western Europe tend to be towards the northern region of the continent.^[4-6]

Dr Martín-Torres: Now, of course, not all patients who develop CAP will die. But even in patients who don't die, the disease can have important long-term effects.

Prof Torres: Yes, that's true. To appreciate the true burden of pneumonia, it is important to look not only at mortality, but also at the overall impact on health and well-being. Studies documenting the effects of CAP on health-related quality of life showed that it takes up to 43 days for people with the bacterial form of the disease to return to full activity.^[7,8] And a study conducted in the Netherlands found that patients with CAP had significantly lower scores on physical functioning and general health components of the SF-36 questionnaire than matched controls, even after 18 months. Patients with comorbidities, in particular, had significant impairments in physical function, physical role function, general health and vitality.^[8,9] In addition, mortality due to CAP in the elderly population at 1 year can reach 35%.^[10]

Dr Martín-Torres: Is there a way to quantify the burden of pneumonia beyond the mortality rate?



Slide 3.

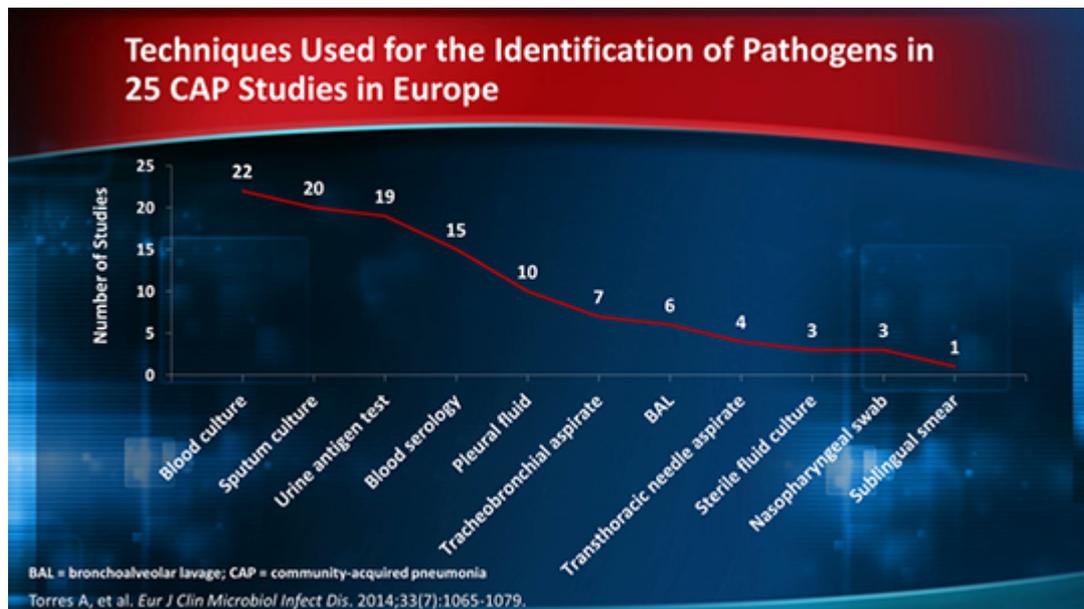
Prof Torres: In its most recent report, the WHO includes data on disability-adjusted life years. This is a summary measure of population health that combines years of life lost from premature death and years of life lived in less than full health. In the most elderly patients, those 80 years of age and older, three-quarters of lost years of life due to infectious or parasitic diseases are accounted for by lower respiratory tract infections. But even in patients aged just 45 to 59 years, almost one-third of lost years of life due to infectious or parasitic diseases are accounted for by lower respiratory tract infections.^[3]

Causes and Pathogenesis of Pneumonia

Dr Martín-Torres: By far the majority of cases of pneumonia are due to infectious causes. The prevalence of specific microorganisms has varied somewhat from one study to the next, possibly due to differences in pneumonia severity, populations studied, and diagnostic tests used in each study.^[11]

Dr Martín-Torres: How much is known about the prevalence of specific microorganisms in CAP?

Prof Torres: Precisely quantifying the prevalence of specific microorganisms is challenging. There are limitations of diagnostic techniques for CAP, and these can lead to inaccurate estimates of pathogen prevalence. If you look at recent CAP studies, the causative organism was not identified in around half of all cases.^[8-12] We recently published a literature analysis designed to generate up-to-date information on the etiology and antibiotic management of CAP in adults across Europe.^[11]



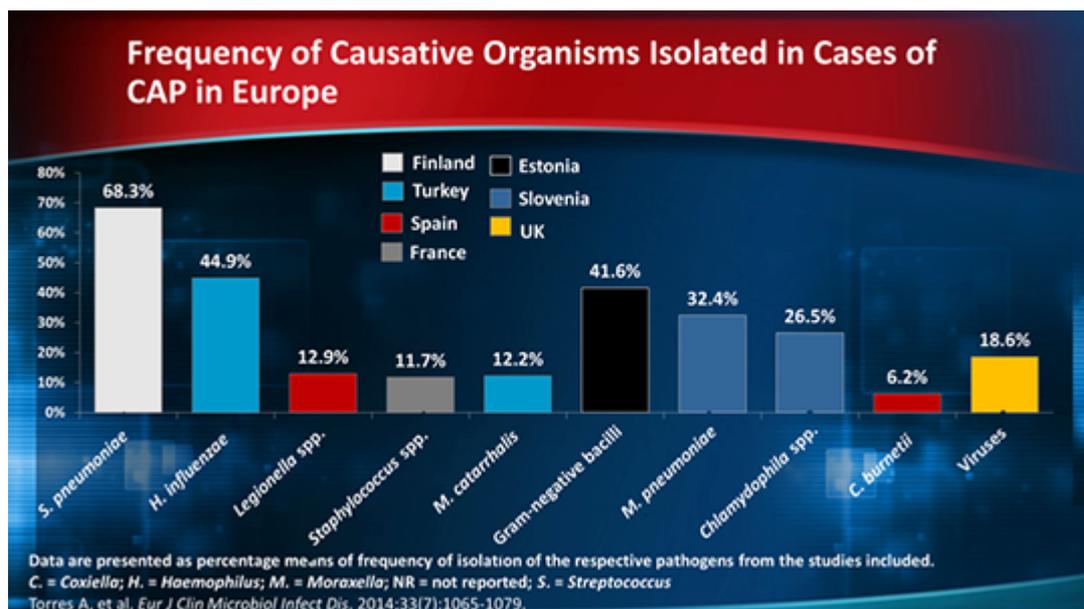
Slide 4.

The analysis summarized data from 25 separate studies that reported on the pathogens identified in patients with CAP. These studies were all published between 2005 and 2012. Blood cultures were carried out in 22 of the 25 studies. Other techniques, such as sputum culture, urine antigen test, and blood serology were also used in a number of studies.

Dr Martín-Torres: In cases where the microorganisms are identified, what pattern do you see?

Prof Torres: I think the situation is quite apparent. Although there is some local variation in the microbiology of CAP, pneumococcus is almost invariably the most likely causative agent.^[8] Pneumococcus is typically identified in around 25-50% of all cases, which is a substantial proportion when you consider that the causative agent is not established in around 50% of cases. In the analysis that I mentioned a moment ago, pneumococcus was identified in 12.0-85.0% of patients.^[11]

Dr Martín-Torres: What other pathogens did you see in that analysis?



Slide 5.

Prof Torres: Other pathogens that were commonly identified in the 25 studies that we analyzed included *Haemophilus influenzae* (*H. influenzae*), Gram-negative enteric bacilli, respiratory viruses, and *Mycoplasma pneumoniae* (*M. pneumoniae*).^[11]

Dr Martín-Torres: And, of course, some cases of CAP have been shown to involve more than one pathogen...

Prof Torres: Yes, around 14-20% of cases appear to involve more than one pathogen.^[11,12] Even among cases where there is a mixture of microorganisms, however, the majority involves pneumococcus.^[12]

Risk Factors and Disease Severity

Dr Martín-Torres: Today, there are good vaccines that can effectively help protect against pneumococcal infection. The potential severity of CAP makes it imperative that patients who are at the greatest risk of developing this disease are recognized and vaccinated. Pneumonia is not confined to the very young and the very old -- several comorbidities and lifestyle factors can also increase a person's risk of developing pneumonia, and vaccination is now recommended for a broader population of patients than in the past.

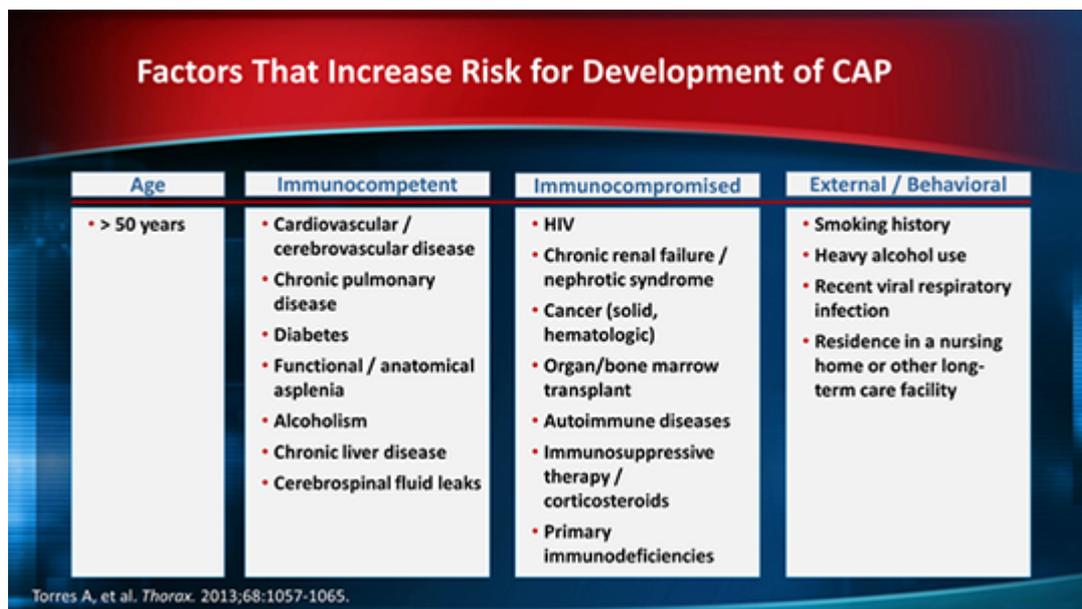
Factors That Increase Risk for Development of CAP		
Age	Immunocompetent	Immunocompromised
<ul style="list-style-type: none"> > 50 years 	<ul style="list-style-type: none"> Cardiovascular / cerebrovascular disease Chronic pulmonary disease Diabetes Functional / anatomical asplenia Alcoholism Chronic liver disease Cerebrospinal fluid leaks 	<ul style="list-style-type: none"> HIV Chronic renal failure / nephrotic syndrome Cancer (solid, hematologic) Organ/bone marrow transplant Autoimmune diseases Immunosuppressive therapy / corticosteroids Primary immunodeficiencies

Torres A, et al. *Thorax*. 2013;68:1057-1065.

Slide 6.

Prof Torres: In addition to age, there are several other factors that can increase a person's risk of developing pneumonia, including a number of chronic diseases. Not surprisingly, asthma and other pulmonary diseases, such as COPD, significantly increase the risk of developing pneumonia. And diabetes, as well as chronic cardiovascular, renal, and hepatic diseases, are all established risk factors.^[13,14] In addition, patients who are immunocompromised -- such as those with HIV infection -- have an increased risk of developing severe infections, including pneumonia.^[13,14]

Dr Martín-Torres: And certain lifestyle behaviors are also major risk factors.



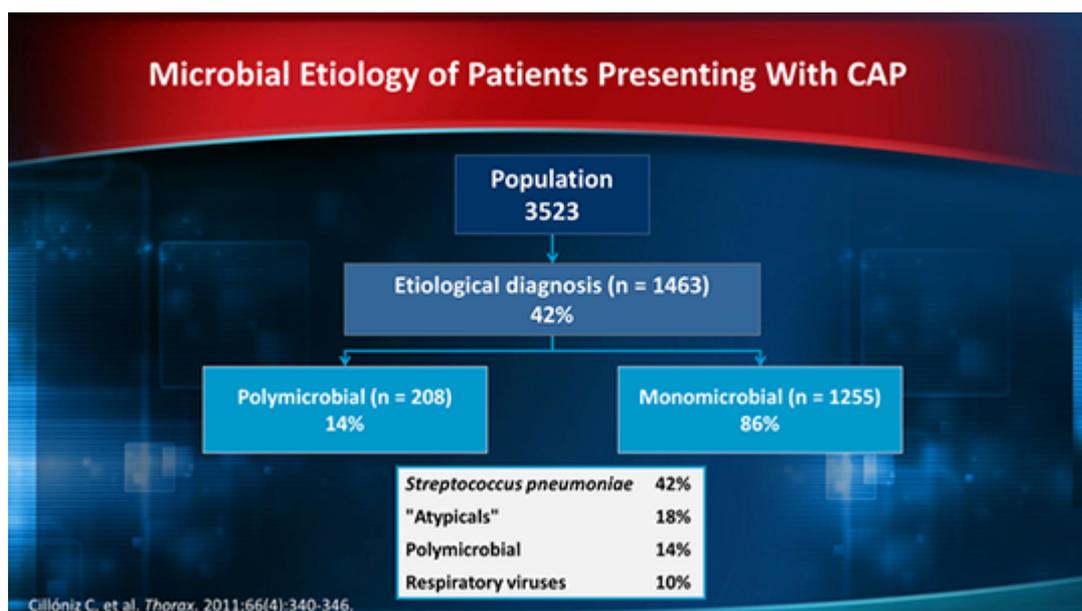
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Prof Torres: That's right. Cigarette smoking is now widely recognized as an independent risk factor for CAP,^[15] and even people who are regularly exposed only through passive smoking are 2.5 times more likely to develop pneumonia.^[13,16] High alcohol consumption also increases a person's risk of developing pneumonia.

Dr Martín-Torres: Do you think that it makes sense, Antoni, to vaccinate all patients who have significant risk factors, regardless of their age?

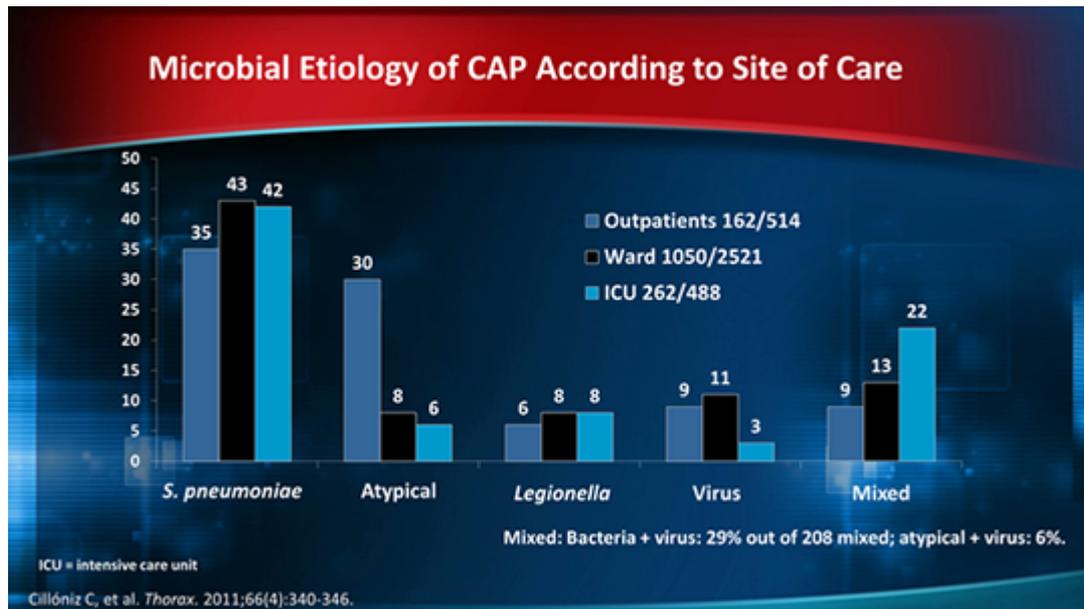
Prof Torres: Yes, the pneumococcal vaccine is now approved for people over 50 years of age. So I generally recommend vaccination to anybody who is over 50 and anybody who has any of those risk factors that we just discussed. This approach is a very practical way to vaccinate the vast majority of patients who need to be protected.

Dr Martín-Torres: We have discussed the different microorganisms involved in CAP. In your experience, does the specific pathogen influence the severity of disease?



Slide 8.

Prof Torres: At our institution, we analyzed the data on all patients who presented to the hospital clinic with CAP over a period of 12 years.^[12] Among the cases for which the etiology was established, 86% were monomicrobial and 14% involved multiple pathogens.



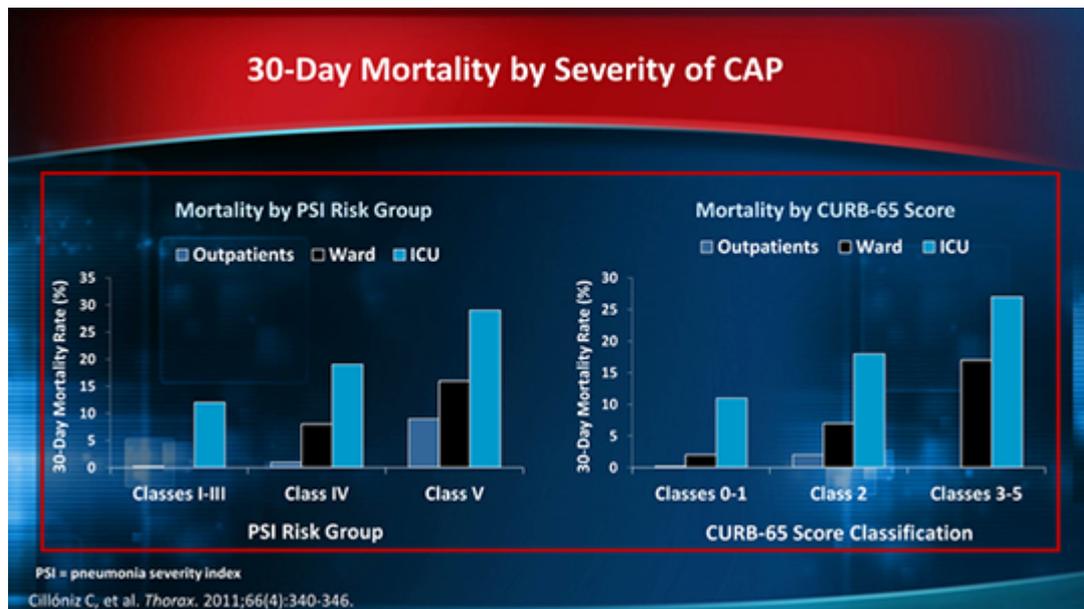
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Pneumococcus tended to result in the most serious forms of pneumonia; whereas this bacterium was isolated in 35% of patients treated on an outpatient basis, the prevalence increased to 42% in patients who were admitted to the intensive care unit (ICU). On the other hand, although atypical pathogens were quite prevalent among patients treated on an outpatient basis, CAP due to atypicals was shown, both clinically and by severity scoring, to be a low-risk infection.

Dr Martín-Torres: You mentioned patients in the ICU. Did a substantial number of patients end up being admitted to the ICU?

Prof Torres: Of all the patients who were diagnosed with CAP at our institution, the overwhelming majority -- 85% -- were hospitalized for treatment.^[12] Of those, the majority were treated in the ward, but 16% required admission to the ICU.

Dr Martín-Torres: What factors have you found are likely to predict a worse outcome in patients who develop CAP?

**Slide 10.**

Prof Torres: Generally speaking, Federico, we know that higher disease severity correlates with greater mortality. Both the **Pneumonia Severity Index** and the **CURB-65** Severity Score have been developed to provide insight into the risk of mortality in a patient with CAP. And, regardless of the treatment setting, 30-day mortality has indeed been shown to increase sharply as these scores increase.^[12]

Dr Martínón-Torres: So any of the characteristics that make up those scores are, in fact, predictors of worse outcomes.

Prof Torres: Exactly. So patient characteristics such as being a **nursing home resident** or having a history of **neoplastic** disease, **liver** disease, **heart failure**, **cerebrovascular** disease, or **renal disease** increase the probability that a patient will have a **worse** outcome if they develop CAP.

Conclusion

Dr Martínón-Torres: As you have heard, CAP is not only an extremely prevalent disease, but also a life-threatening event that is **as serious as a heart attack or stroke**. It is a disease that should be **prevented** whenever possible, and treated **urgently** and **aggressively** when it occurs.

We hope you found the first episode of Pneumonia Television to be informative and helpful. I encourage you to consider the insights provided by Professor Torres, and to look for opportunities to reduce the risk of pneumococcal infection in your own patients. Be sure to join us for the next episode of Pneumonia Television, when we will focus on the management of CAP.

You may now take the posttest by clicking on the "Earn CME Credit" link. Please also take a moment to complete the program evaluation that follows. Thank you for watching today. Goodbye.

This transcript has been edited for style and clarity.

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