Respiratory infections

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A new *European Respiratory Review* series explores respiratory infections https://bit.ly/3A5eN3A

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Respiratory infections, whether acute or chronic, are extremely frequent in both adults and children, representing an increased economic burden on healthcare systems, morbidity and mortality. These infections can be either community- or hospital-acquired. Both non-immunosuppressed and immunosuppressed patients can develop such health issues, although prevalence is higher in the latter group. In terms of microbial aetiology, the causative pathogen can be viral, bacterial, fungal or parasitic. In this *European Respiratory Review* (*ERR*) series, the authors review some key issues relating to the aforementioned topics.

Respiratory viruses may result in severe illnesses capable of inducing acute respiratory failure that could progress to acute respiratory distress syndrome. Before coronavirus disease 2019 (COVID-19), influenza A and B, severe acute respiratory syndrome (SARS) and metapneumovirus constituted clear examples of severe viral respiratory diseases. In recent years, the role of respiratory viruses had been becoming more dominant, but this became even more clear with the emergence of severe acute respiratory syndrome coronavirus 2. With the many cases of severe viral respiratory failure arising during the COVID-19 pandemic, a shift in paradigm took place with respect to how we consider viral respiratory diseases. For example, implementing rapid viral PCR tests in a clinical setting confirmed how their intrinsic role in diagnosing viral respiratory infections, especially in the most severe cases, could promote optimal treatment and further prevent airborne transmission. Cilloniz *et al.* [1] provide an in-depth review of those viruses that lead to severe respiratory failure, placing particular emphasis on lessons learnt during COVID-19.

Community-acquired pneumonia (CAP) is a frequent respiratory infection that presents an overall incidence of 1.2 to 1.4 cases per 1000 inhabitants per year. This incidence increases with age and the number of comorbidities, and in individuals with a positive HIV status. Around 40% of all CAP cases require hospitalisation. Non-hospitalised patients with CAP receive a diagnosis in outpatient settings. Some of these individuals may receive the initial diagnosis in the emergency department, yet due to low disease severity are later transferred to outpatient care. Furthermore, a large portion of these patients will not have microbial diagnoses, which in turn means that most antibiotic treatments are empiric. Mortality in this population is very low and not more than 1%.

For this *ERR* series, Cavallazzi and Ramirez [2] elucidate on how and when to manage respiratory infections outside a hospital setting. They discuss important contentious items relating to diagnosis, microbial aetiology, antibiotic treatment and follow-up.

Severe CAP (sCAP) is the most challenging subgroup of CAP patients. Approximately 5–10% of patients with CAP will present with sCAP and require admission to an intensive care unit. Mortality due to sCAP can reach as high as 40% in patients who experience septic shock and need mechanical ventilation. In a forthcoming review, Niederman and Torres [3] examine controversial issues surrounding sCAP such as the use of rapid molecular methods for microbial diagnosis; the administration of antivirals for influenza; the use of either macrolides or quinolones in combination with β-lactams; the importance of so-called

"non-core pathogens" that would require antibiotics different to those that are standard; the performance and utility of biomarkers (mainly procalcitonin and C-reactive protein) for diagnosis and treatment duration; the use of corticosteroids as anti-inflammatory and immunomodulatory agents; and the use of noninvasive respiratory strategies in patients with respiratory failure to avoid intubation and decrease the risk of mortality.

Recognised by health institutions, medical societies and governments alike, antibiotic resistance has grown to represent a global threat for humans. While the problem pertains to all types of microorganisms, antimicrobial resistance escalation among Gram-negative bacteria raises the most concern. Carbapenem-resistant Enterobacterales and *Pseudomonas aeruginosa*, and multidrug-resistant *Acinetobacter* frequently cause severe infections. In light of Gram-negative resistance posing a formidable threat, many actions must occur across different societal dimensions, from agriculture to government programmes, to general social awareness and strict medical policies. Reynolds *et al.* [4] review all these points for this series.

Due to the rise in multidrug-resistant Gram-negative bacilli, the pharmaceutical industry, with the support of global health authorities and governments, has developed novel antibiotics targeting these pathogens. These antibiotics have been studied in both regulatory programmes and real-world settings. In a forthcoming review, M. Bassetti and colleagues provide a comprehensive description of all of these antibiotics, alongside their regulatory indications and potential fit in new algorithms for antibiotic treatments.

Pulmonary aspergillosis and non-*Aspergillus* mould infections are important, representing difficult-to-treat infections in patients with respiratory issues. These are acquired both in and out of the hospital, particularly in immunocompromised individuals. Bronchiectasis, severe COPD and steroid treatment are particular risk factors that clinicians should consider when there is suspicion of such infections. In this *ERR* series, you can expect to read more about these two types of fungal respiratory infections in depth [5, 6].

In continuation, atypical mycobacterial lung infections are extremely difficult to diagnose and treat. One of the most challenging issues is when and how to treat *Mycobacterium avium* complex (MAC) and *Mycobacterium abscessus*, which is discussed in a review by Kumar *et al.* [7].

Parasitic lung diseases are infrequent overall, albeit not uncommon in tropical countries. They should be identifiable by physicians working in these countries or in conjunction with traveller diseases. Al-Tawfiq *et al.* [8] provide a review of parasitic lung diseases for this *ERR* series.

We hope that you enjoy reading and learning from all of these reviews!

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References

1 Cilloniz C, Luna CM, Hurtado JC, *et al.* Respiratory viruses: their importance and lessons learned from COVID-19. *Eur Respir Rev* 2022; 31: 220051.
2 Cavallazzi R, Ramirez JA. How and when to manage respiratory infections out of hospital. *Eur Respir Rev* 2022; 31: 220092.
3 Niederman MS, Torres A. Severe community-acquired pneumonia. *Eur Respir Rev* 2022; in press [https://doi.org/10.1183/16000617.0123-2022].
4 Reynolds D, Burnham JP, Vazquez Guillamet C, *et al.* The threat of multidrug-resistant/extensively drug-resistant Gram-negative respiratory infections: another pandemic. *Eur Respir Rev* 2022; 31: 220068.
5 Lamoth F, Calandra T. Pulmonary aspergillosis: diagnosis and treatment. *Eur Respir Rev* 2022; in press [https://doi.org/10.1183/16000617.0114-2022].
6 Puerta-Alcalde P, Garcia-Vidal C. Non-*Aspergillus* mould lung infections. *Eur Respir Rev* 2022; 31: 220104.
7 Kumar K, Daley CL, Griffith DE, *et al.* Management of *Mycobacterium avium* complex and *Mycobacterium abscessus* pulmonary disease: therapeutic advances and emerging treatments. *Eur Respir Rev* 2022; 31: 210212.
8 Al-Tawfiq JA, Kim H, Memish ZA, *et al.* Parasitic lung diseases. *Eur Respir Rev* 2022; in press [https://doi.org/10.1183/16000617.0093-2022].