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Short Communication

Ongoing post-pandemic peak of *Mycoplasma pneumoniae* cases in July 2024: A single-center experience in north-west Italy

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ABSTRACT

We report an increase of *Mycoplasma pneumoniae* (*Mp*) respiratory infections during 2023-2024. The positive rate in 2024 is higher at 68 per 1668 (5%) compared with 2023 at nine per 1264 (0.7%), highlighting the *Mp* increased circulation in north-west Italy. The increase in *Mp* cases showed an outbreak in July 2024.

Introduction

Mycoplasma pneumoniae (*Mp*) is the principal agent of atypical pneumonia in adults and children [1,2]. During the SARS-CoV-2 pandemic, the use of personal protective equipment (i.e. face masks) and physical distancing were used to reduce the incidence of infections caused by all respiratory pathogens [3]. With the international public health emergency ending in early 2023, anticipated by the end of preventive measures in mid-2022, an increase of respiratory infections caused by viral pathogens was reported in different settings [3]. However, still limited are the reports on *Mp* incidence, with few studies coming from Denmark, Switzerland, Spain, and France in Europe and China in Asia [4–9]. To the best of our knowledge, no studies were published from Italy.

Material and methods

Here, we report a survey from our laboratory surveillance system at the University Hospital of Varese (north-west Italy), serving as the only microbiological hub in an area of almost 500,000 people. In our survey, all nasal swabs (NSs) and, in more severe cases, all bronchoalveolar lavages (BALs) tested with a molecular syndromic panel for respiratory infections, including *Mp*, from January 1, 2023 to July 24, 2024 were considered. The panels including *Mp* were the Biofire FilmArray Respiratory Panel 2 Plus Assay for NS, Pneumoplus v2.0 for BAL (bioMerieux; Marcy l'Etoile, France), and the Allplex Respiratory Panels 1, 2, 3, and 4 kit for NS and BAL (Allplex; Seegene, Republic of Korea). Statistical analyses were performed using JASP v0.19.0 (https://jasp-stats.org/). Specifically, Pearson coefficients were used to assess the correlation between patient's age and hospitalization length (Appendix Figure 1), whereas Student's *t*-test was used to assess the presence of a statistical difference in the age of patients grouped by the detection or the absence of other microorganisms in the same sample (Appendix Figure 2). All images were further elaborated using the open source InkScape software (https://www.inkscape.org) v1.3.2.

Results

Overall, a total of 2936 respiratory samples obtained from 2746 patients were tested in the considered period. *Mp* was detected in 78 samples, obtained from 2746 (3%) patients.

The median age of patients who tested positive was 11 (range 0-58 years), with 63 (81%) children (i.e. younger than 17 years old). Patients who tested positive were mostly (58%) male. The *Mp* positivity rate varied throughout the study period, with no case from January 2023 to August 2023, and a total of nine of 760 (1.2%) cases in late 2023 from September to December (Figure 1). The *Mp* positivity rate was constant in the first trimester of 2024 (January, February, and March) (three of 251 [1.2%], four of 222 [1.8%], two of 268 [0.7%], five of 242 [2%]). Of

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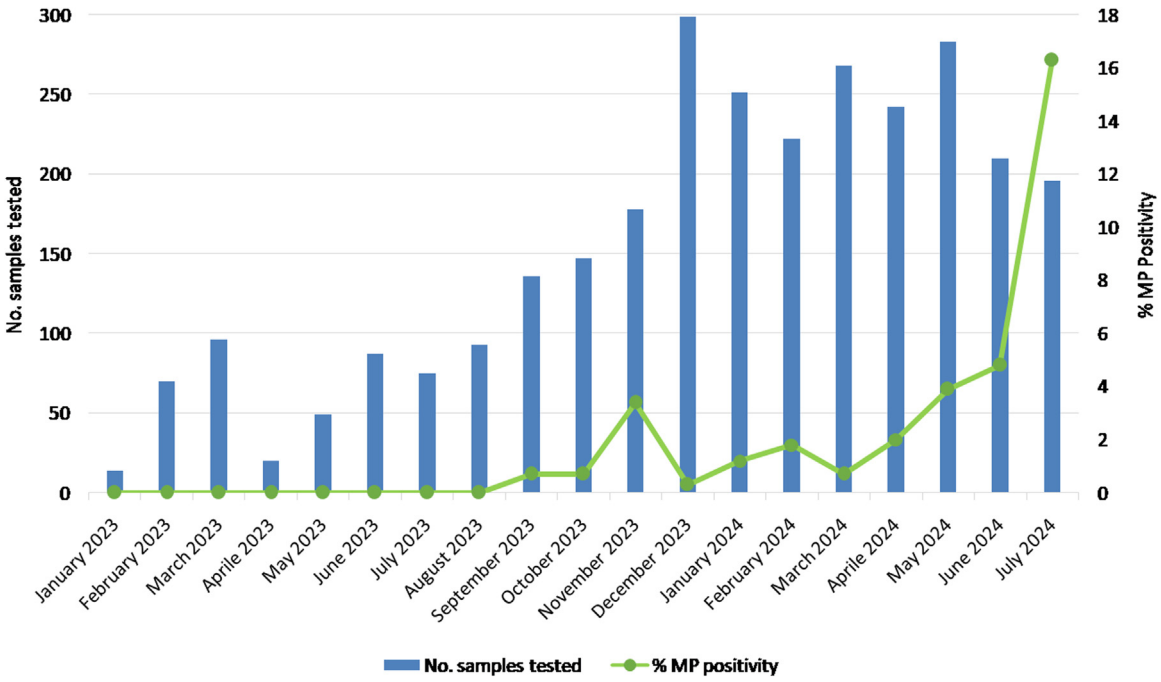

Figure 1. Monthly distribution, from January 1, 2023 to July 24, 2024, of *Mp* reverse transcription-polymerase chain reaction tests performed and positive cases in the University Hospital of Varese (north-west Italy). *MP, Mycoplasma pneumonia*.

note, from April to July 2024, the number of *Mp* cases raised markedly: five of 242 (2%) in April, 11 of 283 (4%) in May, 10 of 210 (5%) in June, and 34 of 196 (17%) in July (Figure 1).

A total of 63 (81%) patients who tested positive for *Mp* were hospitalized and, among them, three patients (all older than 40 years old) were admitted to the intensive care unit due to respiratory complication needing ventilatory support. Most patients (54 of 78 [70%]) had radiographic evidence of unilateral or bilateral pneumonia. The median length of stay was 3 (range 1-42) days. Importantly, in our analysis, a significant positive correlation between age and longer length of stay was observed ($P = 0.009$) (Appendix Figure 1a). The main clinical features of patients who tested positive are summarized in Table 1.

Overall, 34 of 78 (44%) patients who tested positive for *Mp* presented at least one co-detected target beyond *Mp*, with 25 (74%) featuring one additional and 9 (26%) two or more microorganisms. The most common viral co-detections were with rhinovirus (n = 15; 44%), parainfluenza 3 (n = 6; 18%), coronavirus OC43 (n = 2; 6%), parainfluenza 2 (n = 2; 6%), SARS-COV-2 (n = 2; 6%), influenza A (n = 1; 3%), and parainfluenza 1 (n = 1; 3%). Bacterial co-detections were mostly represented by *Haemophilus influenzae* in eight of 34 (23%) and *Streptococcus pneumoniae* in seven of 34 (21%). Interestingly, co-infection did not appear to affect the severity of clinical presentation, as suggested by the higher rate of co-detection observed in children than adult patients (Appendix Figure 1). The median age of patients with co-detection was significantly

Table 1
Demographic and clinical characteristics of 78 patients who had an *Mp* infection diagnosed by molecular test; Varese, Italy; January 1, 2023 to July 24, 2024.

Characteristics	Overall n (%)
No. patients who are *MP*-positive	78 (3)
Sex	
Male	45 (58)
Female	33 (42)
Median age, year (range)	11(0-58)
Age group, years	
0-4	10 (13)
5-17	53 (68)
18-58	15 (19)
Co-infections	
No. patients tested	78 (100)
No. patients with co-infection	34 (44)
With 1 pathogen	25 (74)
With ≥2 pathogen	9 (26)
Median age, years (range)	13 (0-57)
Clinical presentation	
Fever	61 (78)
Cough	58 (74)
Dyspnea	27 (35)
Runny nose	12 (15)
Abdominal pain	10 (13)
Unknown	12 (15)
Radiographic findings	
Multilobar infiltrates (unilateral)	37 (47)
Multilobar infiltrates (bilateral)	17 (22)
No parenchimal involvement	5 (6)
Unknown	19 (24)
Antibiotics class	
Macrolides[a]	47 (60)
Beta lactams[b]	3 (4)
Quinolones[c]	4 (5)
Tetracyclines[d]	3 (4)
No antibiotics therapy	21 (27)
Severity of illness	
Intensive care unit admission	2 (3)
Invasive mechanical ventilation	2 (3)
Length of stay, day, median (interquartile range)	3 (0-42)
Hospitalization	
Respiratory symptoms	60 (77)
Other	3 (4)
No hospitalization	15 (19)

MP, Mycoplasma pneumonia.
[a] Azithromycin or clarithromycin
[b] Ampicillin or amoxicillin/clavulanic acid
[c] Levofloxacin
[d] Doxicycline.

lower (10.8 years) than the median age of patients without co-detection (18.1 years) ($P = 0.009$) (Appendix Figure 2).

Discussion and conclusion

Epidemiology studies circulation of *Mp* in respiratory samples of patients admitted to emergency room or hospitalized are scarce in Italy.

Our study has several limitations: (i) this is a monocentric study and (ii) we could not perform antimicrobial susceptibility testing; however, the outcome of our patients after macrolide treatment is favorable.

Our patient population who is *Mp*-positive is in series with European surveillance in age and gender. As reported by others, the number of *Mp* cases is higher in November 2023 [4–7]. However, the increase in the number of cases is even more pronounced in July 2024. Our results showed a marked increase of *Mp* detection in the north-west of Italy, in line with other countries [4–8], but was never reported in Italian recent report. A high rate of coinfections (44%) was documented in France [7] and less frequent in the United States [10]. However, the most common viral agent in all reports is rhinovirus. In addition to the other surveillance studies, we found a positive correlation between adults and the number of days spent in the hospital.

In conclusion, our results indicate that *Mp* cases are probably underestimated in Italy because the respiratory specimens are not systemically tested for this pathogen in our country. The increasing number of *Mp* cases highlights the importance of atypical pneumonia pathogens molecular screening in the pediatric and adult populations to improve the diagnosis and targeted antibiotic treatment.

Declarations of competing interest

The authors have no competing interests to declare.

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Ethical statement

Ethical approval was not needed for this retrospective study because the study was part of routine management and treatments for patient.

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Author contributions

All the authors contributed significantly to this manuscript. Federica Novazzi wrote the first draft; Gabriele Arcari took care of the statistical section and revise the manuscript; Angelo Paolo Genoni, Francesca Drago Ferrante, and Sara Boutahar analyzed the clinical specimens; Simona Perniciaro e Massimo Agosti contributed to the critical analysis of the data and revised the manuscript; Simona Perniciaro e Niccolò Niccolini collected the clinical data and revised the manuscript; Nicasio Mancini designed the study and supervised the manuscript. All authors reviewed and approved the final submission.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.ijregi.2024.100554.

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