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Perspective

Looking for fever in nursing home residents with COVID-19: A false friend?

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\section*{A B S T R A C T}

\textbf{Objectives:} Residents in nursing homes represent a frail, elderly population, and severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) infection can spread easily in this setting. Despite a frequent severe evolution of coronavirus disease 2019 (COVID-19), these patients often present an atypical course with mild initial symptoms. The aim of this study was to assess the occurrence of fever in elderly patients with COVID-19 residing in nursing homes.

\textbf{Methods:} Two hundred and thirty-one elderly patients from three nursing homes in Pavia and surrounding area were enrolled in April–May 2020. SARS-CoV-2 infection was diagnosed using real-time reverse transcription polymerase chain reaction with nasopharyngeal swab and/or serological assay (LIAISON® SARS-CoV-2 S1/S2 IgG). Patients with a positive result on RT-PCR or serology were classed as positive.

\textbf{Results:} In total, 170 patients (74\%) were SARS-CoV-2-positive on RT-PCR and/or serology, and 61 patients (26\%) had negative results on both tests. Fever (body temperature $>37.5^\circ\text{C}$) was observed in four patients (1.7\%); three in the SARS-CoV-2-positive group (1.8\%) and one in the SARS-CoV-2-negative group (1.6\%).

\textbf{Conclusions:} The prevalence of fever was extremely low in this population of nursing home residents with COVID-19. This finding must be taken into consideration when screening patients without fever in nursing homes.

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In Italy, the first wave of the coronavirus disease 2019 (COVID-19) pandemic mainly hit the northern regions with critical consequences, particularly for the elderly population. Residents in nursing homes, often affected by multiple comorbidities, are at greater risk of serious – potentially fatal – disease (Liu et al., 2020). It has been observed that elderly patients with COVID-19 often do not present classic symptoms (such as fever or cough), but can have an atypical course of disease (such as delirium, abdominal pain and low-grade pyrexia) (Tay and Harwood, 2020).

In this study, medical history, clinical data and body temperature were collected for 231 elderly patients (median age 86 years, mostly female) from three nursing homes in Pavia and surrounding area from 1 April to 31 May 2020. Severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) infection was diagnosed using real-time reverse transcription polymerase chain reaction (RT-PCR) with nasopharyngeal swab and/or serological assay (LIAISON® SARS-CoV-2 S1/S2 IgG). Temperature measurements and RT-PCR were performed on the same day during clinical evaluation when clinical suspicion arose. Serology was taken afterwards to identify all patients with COVID-19, including asymptomatic patients or those with a false-negative RT-PCR result. In total, 170 patients (74\%) were SARS-CoV-2-positive on RT-PCR and/or serology, and 61 patients (26\%) had negative results for both tests. No significant differences in age or sex were found between the SARS-CoV-2-positive and -negative patients.

Based on the serological results, 148 of 231 patients developed immunoglobulin G specific for SARS-CoV-2. Nearly 54\% (67/125) of patients with positive SARS-CoV-2 serology also had a positive RT-PCR result. RT-PCR results were not available for 23 patients who tested positive on serology.

Among the study population, fever (defined as body temperature $>37.5^\circ\text{C}$, measured with an infra-red thermometer) was
observed in four patients (1.7%): three in the SARS-CoV-2-positive group (1.8%) and one in the SARS-CoV-2-negative group (1.6%). Among the 70 patients with a positive RT-PCR result (30% of the entire population), only one patient had fever. This percentage was much lower than expected based on the literature.

The prevalence of fever was extremely low in the study population, despite the fact that this is one of the most commonly reported signs in patients with COVID-19 (Amado et al., 2020). This evidence emerged in the context of scanty literature on this topic, with few reports on the prevalence of fever among nursing home residents with COVID-19 (Gnanasambantham et al., 2020; Liu et al., 2020; McConeghy et al., 2020). It appears that nursing home residents, who are elderly and frail, while being at high risk for the spread of SARS-CoV-2 infection, are less likely to have fever than younger patients. Immunosenesence and alterations in the cytokine cascade may play a role in this process (Kerr and Stacpoole, 2020).

This finding must be taken into consideration when screening patients without fever in nursing homes, especially with the incoming second wave of the COVID-19 pandemic.

Conflict of interest

None declared.

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Ethical approval

This study was approved by the IRCCS San Matteo Hospital Ethical Committee (Prot. 20,200,069,910).

References

Amado CM, Minahk CJ, Cilli E, Oliveira G, Dupuy FG. COVID-19: discovery, diagnostics and drug development. J Hepatol 2020, doi:http://dx.doi.org/10.1016/j.jhep.2020.09.031.
Gnanasambantham K, Aitken G, Morris B, Simionato J, Chua EH, Ibrahim JE. Developing a clinical screening tool for identifying COVID-19 infection in older people dwelling in residential aged care services. Australas J Ageing 2020, doi: http://dx.doi.org/10.1111/ajag.12884.
Kerr AD, Stacpoole SR. Coronavirus in the elderly: a late lockdown UK cohort. Clin Med 2020, doi:http://dx.doi.org/10.7861/clinmed.2020-0423.
Liu K, Chen Y, Lin R, Han K. Clinical features of COVID-19 in elderly patients: a comparison with young and middle-aged patients. J Infect 2020;80:e14–8.
McConeghy KW, White E, Panagioutou OA, Santostefano C, Halladay C, Feifer RA, et al. Temperature screening for SARS-CoV-2 in nursing homes: evidence from two national cohorts. J Am Geriatr Soc 2020;68:2716–20.
Tay HS, Harwood R. Atypical presentation of COVID-19 in a frail older person. Age Ageing 2020;49:523–4.