ORIGINAL RESEARCH ARTICLE

Recent trends and determinants of surge in absences among healthcare workers: The case of Padua Hospital

CHIARA DAICAMPI[1], ENRICA FRASSON[2], MARIO DEGAN[3], MICHELE TESSARIN[4], FABIO PERINA[4], LUCIA STIVANELLO[3], NICOLA TREVISAN[3], ILARIA DE BARBIERI[3], ERICA MARCOLIN[5], ELENA MASSAROTTO[5], FEDERICA DOTTO[5], MICHELA ZANELLA[5], SALVATORE PIANO[1], VINCENZO BALDO[2]

[1]Department of Medicine, University of Padua, Padua, Italy; [2]Department of Cardiac, Thoracic, Vascular Sciences and Public Health, University of Padua, Padua, Italy; [3]Healthcare professionals management Unit, Azienda Ospedale-Università Padova, Padua, Italy; [4]General, Administrative and Health Management Unit, Azienda Ospedale-Università Padova, Padua, Italy; [5]Human Resources Management Organizational, Affiliated University Personnel, and University Relations Complex Operational Unit, Azienda Ospedale-Università Padova, Padua, Italy

ABSTRACT

Background: The global shortage of healthcare professionals is critical, with the WHO reporting a deficit of 5,9 million nurses in 2020 - a number expected to increase due to rising demand and high turnover. In high-income countries, absenteeism among healthcare workers, absence due to personal or health reasons, worsens this shortage, causing service disruptions, reduced productivity, and higher costs. This study examines trends in absences among non-medical staff at the Azienda Ospedale-Università Padova (AOUP), a large hospital in the Veneto Region, employing nearly 7,000 staff.

Methods: A descriptive longitudinal analysis was conducted using administrative data from January 2018 to December 2023. Absence days per Full-Time Equivalent (FTE) were classified as sickness, injury, maternity, authorized, unpaid, vacation, and COVID-related (from 2020). Absence rates were standardized per 100 FTE-days with 95% confidence intervals. Workforce composition before and after the 2020 reorganization was assessed to control for structural changes.

Results: From 2018 to 2023, average absence days per employee (including vacation) rose by 2.86 days, peaking in 2022. Sickness absences rose by 9.9%, paid leave days by 24.8%, and unpaid leave by 6.1%, while injury (–36.7%)

Received: 8 September 2025 | Accepted: 4 January 2026

Correspondence: Enrica Frasson, MD / Department of Cardiac, Thoracic, Vascular Sciences and Public Health, University of Padua, Via Giustiniani, 2, 35128, Padua, Italy / E-mail: enrica.frasson@studenti.unipd.it
ORCID: 0009-0006-7346-6698

and maternity leave (–6.2%) declined. The 2022 peak corresponded to a temporary reduction of ≈ 330 FTEs in active service. Young nurses and young healthcare assistants (<30 years) experienced the sharpest increases.
Discussion: The findings reflect both post-pandemic effects and regulatory changes, including the November 2022 CCNL reform, which simplified certification for personal reason leave. Despite a post-pandemic decline, absence rates remain above pre-2020 levels, driven by sustained workload and psychosocial stress. The study highlights the need for workforce policies addressing structural and behavioural determinants of absenteeism.

Key words: determinants of healthcare professional absenteeism, healthcare resource management, healthcare professional shortage, Full Time Equivalent (FTE), non-medical employees, hospital

Introduction

The shortage of healthcare professionals represents a critical global challenge, with serious repercussions for healthcare systems worldwide. In 2020, the World Health Organization (WHO) highlighted a global shortfall of 5,9 million nurses, which amounts to nearly a quarter of the currently available workforce (28 million people) (1). The International Council of Nurses (ICN) estimates that this shortage could rise to 13 million in the future, due to the growing demand for healthcare services and high staff turnover (2). In high-income countries, in addition to dealing with a chronic shortage of staff, health authorities are increasingly facing another phenomenon among frontline workers: a rise in absences. In Italy, the loss of attractiveness of healthcare professions and the aging of health professionals are ongoing issues that the regions are addressing (3). Approximately 7% of healthcare workers worldwide take at least one day off per week (4). The absenteeism rate, or the ratio of absence days to working days, is steadily rising internationally: for instance, in the United Kingdom, the sickness absence rate reached 5.6% in 2022, a notable increase from 4.3% in 2019 (5). Specifically, the sickness absence rate among healthcare workers is significantly higher compared to other sectors. In 2022, while the general absence rate for UK workers was 2.6%, healthcare workers' rate rose to 5.6% (6). The repercussions of the rising number of absences in the healthcare sector are substantial, including challenges in maintaining essential standards to ensure healthcare services. Additionally, there is a financial impact on the healthcare system due to the salary coverage required for most absences (7). Despite various strategies being adopted in many countries to address absenteeism in the healthcare sector, a recent systematic review of the literature suggests that the issue remains significant (8). At the national level, there is currently no systematic assessment of absenteeism trends in the healthcare sector. Our study, therefore, aims to describe and analyse the patterns and determinants of staff absences at the University Hospital of Padua (AOUP), providing an example of absenteeism trends and types among employees within the context of the Italian healthcare service. The University Hospital of Padua (AOUP), a public hospital with 1,682 beds and over 6,100 employees, is one of the largest hospitals in Italy. It is recognized as a National Reference Hospital of High Specialization and designated as a Hub Hospital for clinical networks and centres of excellence of regional relevance. The results will lay the foundation for the development of targeted strategies aimed at evaluating the impact of absences on staffing needs and improving employee well-being.

Methods

Study design and population

This descriptive longitudinal study analysed administrative data from the University Hospital of Padua (Azienda Ospedale–Università Padova, AOUP), covering the period January 2018 to December 2023. The study population included all non-medical employees of the hospital, such as nurses, healthcare assistants (OSS), midwives, technicians, administrative staff, social workers, prevention and rehabilitation

professionals, and non-healthcare technicians. In 2020, AOUP incorporated another hospital, transferring 725 personnel units (approximately 701.25 Full-Time Equivalents, FTE) into its structure. To evaluate potential confounding due to this reorganization, the workforce composition was compared before (2018–2019) and after (2020–2023) the merger. The analysis showed only minimal changes in professional and age distribution, suggesting limited structural effects on absence trends.

Data source and management

Data were extracted from the internal Human Resources administrative information system (HR/payroll) in April 2024. The dataset included only active employees for each reference year. Duplicate records and entries with missing identifiers were excluded before analysis. Missing values in absence categories were set to zero where appropriate. No data imputation was performed; data completeness exceeded 99% for all variables.

Outcome definition and standardization

The outcome of interest was the number of absence days per year for each employee, classified into the following categories: *vacation, sickness, injury, maternity leave, paid leave, unpaid leave,* and *COVID-related absences* (from 2020 onward). For the primary outcome, vacation days were excluded because they represent an inalienable right. Absence rates were standardized by expressing total days of absence as days per 100 FTE-days. One FTE corresponds to 260 working days per year. This approach normalizes for differences in workforce size, part-time contracts, and annual variability. Annual values and 95% confidence intervals were calculated for the period 2018–2023.

Statistical analysis

Given the count distribution of absence data and the presence of overdispersion, we used Generalized Linear Models with a Negative Binomial distribution and log link function. The dependent variable was the number of absence days (excluding vacation), while the natural logarithm of FTE was included as an offset, allowing the model to estimate absence rates rather than raw counts. Independent variables included year, professional role, and age group, with additional exploratory analyses. All analyses were conducted using Jamovi (version 2.6.44).

Sensitivity to structural and policy changes

During the study period, two major institutional events occurred that could potentially influence absence patterns. The first was the 2020 hospital reorganization, which incorporated another hospital into the University Hospital of Padua, leading to changes in workforce composition. The second was the November 2022 renewal of the national collective labour agreement which simplified the administrative requirements for short personal reason leave. To account for these potential sources of bias, the regression models included calendar year as a covariate, capturing gradual level and trend changes over time. In addition, descriptive before/after comparisons were examined to contextualize possible discontinuities related to these events. These checks were intended to verify the robustness of the overall temporal patterns without implying a formal interrupted time-series design.

Ethical approval

The study was approved by the Ethics Committee of the hospital (reference number: 549n/25).

Results

General trend of absences

As shown in Figure 1, over the study period, the average number of absence days per employee at AOUP showed a moderate upward trend.

Including vacation days, the average number of absence days per employee increased by 2.86 days between 2018 and 2023 (+4.17%). The highest peak was recorded in 2022, with an increase of 11.86 days per employee compared to 2018. Specifically, the mean number of absence days per employee was: 68.48 in 2018, 68.17 in 2019, 66.75 in 2020, 69.40 in 2021, 80.34 in 2022, and 71.34 in 2023.

When vacation days—considered an inalienable right—were excluded, the average number of absence

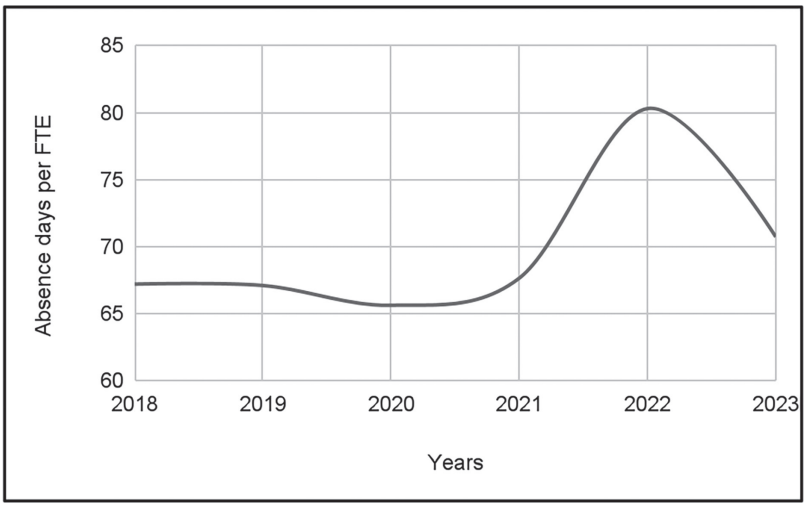

Figure 1. Trends in total absence days (including vacation) among non-medical employees, 2018–2023.

Values are mean absence days per full-time-equivalent (FTE) employee per year (1 FTE = 260 working days).

days rose from 35.17 in 2018 to 37.07 in 2023, again peaking in 2022 (49.38 days). Over the entire period, this corresponds to an average increase of 1.90 days per employee. To better illustrate the organizational impact, total absences were also expressed in Full-Time-Equivalent (FTE) units, assuming 260 working days per FTE per year. Based on this conversion, comparing 2023 to 2020, the cumulative loss of working time corresponds to approximately 130 FTEs (129.9) temporarily unavailable in active service. The estimated loss of about 330 FTE refers instead to the 2022 peak, whereas 129.9 FTE represents the cumulative increase from 2020 to 2023, capturing different dimensions of the same trend.

Standardized absence rates (per 100 FTE-days)

To ensure comparability across years, absence rates were standardized as days of absence per 100 Full-Time-Equivalent (FTE) days, excluding vacation. One FTE corresponds to 260 working days per year, meaning that the indicator represents the proportion of total working time lost to absence after adjustment for workforce size and contractual variation. Between 2018–2023, standardized absence rates (Table S1) ranged from 13.0 to 19.0 days per 100 FTE-days. The highest rate occurred in 2022 (18.99 per 100 FTE-days; 95% CI 18.92–19.07), while the lowest was in 2019 (13.00; 95% CI 12.93–13.07). In 2023, the rate declined to 14.25 (95% CI 14.19–14.32), remaining slightly above pre-pandemic levels. These standardized results confirm the temporary surge observed in 2022 and the subsequent partial normalization. When interpreting these temporal patterns, two contextual events are worth noting. A moderate upward shift in total absences occurred after the 2020 hospital reorganization, consistent with the integration of additional staff from the merged facility. A sharper rise was observed in 2022–2023, temporally aligned with the November 2022 renewal of the national collective labour agreement, which simplified the authorization procedure for short personal-reason leave. These descriptive patterns support the interpretation of 2022 as a transient peak influenced both by organizational and policy-related factors.

Workforce composition before and after the 2020 reorganization

Role mix

To assess potential compositional shifts following the 2020 hospital reorganization, we examined the distribution of the two largest non-medical professional

categories—nurses and healthcare assistants—representing the majority of the AOUP non-medical workforce. Before 2020, the workforce consisted of 64.3% nurses and 18.7% healthcare assistants; in the post-2020 period these proportions were 60.9% and 21.9%, respectively. The data indicate a modest relative decrease in the proportion of nurses (–3.3 percentage points) and a parallel increase in healthcare assistants (+3.2 percentage points). These small variations are consistent with the integration of additional non-medical units during the merger but do not indicate a substantial structural change in overall professional composition.

Age mix

Average age by professional group was compared before (2018–2019) and after (2020–2023) the 2020 reorganization. The mean age of nurses and healthcare assistants showed minimal variation (Δ < 0.3 years), indicating stable age profiles across the study period. Overall, these findings suggest that the 2020 structural integration produced only limited changes in the composition of the non-medical workforce—both in terms of role and age mix—and is therefore unlikely to confound subsequent analyses of absence behaviour.

Analysis of absences by type

As shown in Table 1, the distribution of absences by category was analysed by calculating, for each year, the ratio between the number of absence days for each type and the corresponding FTEs. A comparison was then made between 2022 and 2023—the years with the largest variations in absences—and the baseline year, 2018.

Between 2018 and 2023, there was a 2.9% increase in the "vacation" category (from 33.32 to 34.27 average days per FTE), a 9.9% increase in sickness absences (from 13.13 to 14.42), a 24.8% increase in paid leave days (from 5.66 to 7.06), and a 6.1% increase in unpaid leave (from 4.81 to 5.11). In contrast, maternity leave decrease by 6.2% (from 9.89 to 9.28) and injury leave decrease by 36.7% (from 1.68 to 1.06). COVID-related absences, introduced as a separate administrative category in 2020, reached 9.52 days per FTE in 2022, before almost disappearing (0.14 days per FTE) in 2023, reflecting the progressive normalization of work organization after the pandemic

Analysis of absences by age group

The analysis of absence days by age group showed distinct patterns among professional categories.

In 2023, healthcare assistants accumulated 82,047 days of absence, while nurses recorded 198,098 days of absence. All other professional categories collectively registered 73,807 days of absence that year. Subsequent analyses focused on the most numerous professional profiles within the AOUP - nurses and healthcare assistants - which together accounted for many total absences. As shown in Table 2, the number of absence days increased in nearly all age groups between 2018 and 2023, with the largest rise observed among nurses under 30 years of age (≈

Table 1. Distribution of absence days by category and year, AOUP 2018–2023

Absence grouping	2018	2019	2020	2021	2022	2023	Δ 2022-2018	Δ 2023-2018	% variation 2023-2018
Vacation	33.32	34.36	31.32	31.34	30.96	34.27	-2.36	0.95	2.90%
Sickness	13.13	13.98	14.56	14.47	18.83	14.42	5.7	1.3	9.90%
Injury	1.68	1.67	1.01	1.43	1.17	1.06	-0.51	-0.62	-36.70%
Maternity leave	9.89	8.86	6.63	7.85	8.97	9.28	-0.92	-0.61	-6.20%
Paid leave	5.66	5.94	5.2	5.5	6.02	7.06	0.36	1.4	24.80%
Unpaid leave	4.81	3.36	3.49	4.12	4.87	5.11	0.06	0.3	6.10%
Covid	-	-	4.54	4.7	9.52	0.14	-	0.14	

Mean number of absence days per Full-Time Equivalent (FTE) for each absence type. Values are expressed as days per FTE per year.

Table 2. Absence days among nurses by age group, AOUP 2018–2023

Nurse							
Age	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**Δ 2023-2018**
<30	52.93	43.66	46.50	42.49	52.57	66.08	13.16
30-39	101.56	92.13	79.98	85.61	96.08	92.32	-9.25
40-49	59.20	62.44	63.26	63.63	74.10	62.64	3.44
50-59	61.42	62.94	63.11	65.89	75.67	71.05	9.63
>60	83.35	90.7	74.38	84.69	85.67	62.56	-20.79

Total absence days per FTE by age group and year. The <30 years group showed the highest increase over the study period.

+13 days per FTE). More moderate increases were recorded in the 40–49 and 50–59 age groups, while a slight reduction occurred among the 30–39 group. Absences peaked in 2022 across all age groups, followed by a modest decline in 2023. Overall, these results indicate that younger nurses consistently exhibited the largest increase in absence days over the study period compared with their older colleagues.

As shown in Table 3, healthcare assistants displayed a similar age-related pattern in absence days.

No healthcare assistants under 30 years were employed in 2018; therefore, for this stratum changes are reported from 2019 onward. From 2019 to 2023, absence days increased from 31.11 to 71.80 days per FTE (Δ = +40.69). The 30–39 group, by contrast, recorded a slight reduction in absence days over the same period. For the 40–49, 50–59, and >60 age groups, absences increased markedly in 2022 and remained higher in 2023, although the pace of growth slowed (ranging between +6 and +12 days per FTE). In descriptive terms, younger healthcare assistants consistently exhibited a steeper increase in absence days over time than their older counterparts, mirroring the pattern observed among nurses.

As shown in Table 4, the group of nurses under 30 years of age—which recorded the highest overall increase in absence days between 2018 and 2023—showed heterogeneous patterns across absence types. The most notable increases were observed for vacation (+9.7 days per FTE), maternity leave (+8.7 days), and sickness (+2.9 days), while smaller rises occurred in paid leave (+2.2 days) and injury (+0.1 days). Conversely, a marked decrease was observed for unpaid leave (−10.6 days) over the same period. COVID-related absences appeared only from 2020 onward, peaking in 2022 and nearly disappearing in 2023. These results indicate that the rise in total absences among younger nurses is largely explained by an increased use of legitimate leave categories—particularly vacation and maternity leave—rather than by a disproportionate growth in sickness-related absences. This finding supports the interpretation that the overall pattern reflects structural and demographic factors rather than behavioural differences across age groups.

Multivariable regression analysis of absence days

To account for overdispersion in absence counts and to control for differences in workforce exposure, a Negative Binomial Generalized Linear Model (GLM) with a log link function was fitted, including the natural logarithm of FTE as an offset. The dependent variable was the number of absence days (excluding vacation), while year, age group, and professional role were included as independent variables. Model fit was acceptable (*deviance/df = 1.12*), and results are expressed as Incidence Rate Ratios (IRR) with 95% confidence intervals. As detailed in Tables S2-S3, both year and age group had statistically significant effects on absence rates, whereas professional role did not. Compared with the reference year (2018), absence rates were significantly higher in 2022 (*IRR = 1.29; 95% CI 1.06–1.58; p = 0.012*), while the other years showed no significant deviations. Regarding age, all groups had lower absence rates compared with the 30–39-year reference category, with the most pronounced reduction among workers under 30 years of age (*IRR = 0.47; p < 0.001*). No significant difference emerged between

Table 3. Absence days among healthcare assistants (OSS) by age group, AOUP 2018–2023

Healthcare assistant							
Age	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**Δ 2023-Baseline**
<30	-	31.11	34.46	57.55	45.06	71.80	40.69*
30-39	90.86	77.13	60.60	65.87	81.16	75.52	-15.34
40-49	57.91	59.30	60.19	70.71	81.23	70.18	12.27
50-59	65.54	69.38	70.38	78.58	88.08	77.48	11.93
>60	79.47	82.94	79.40	82.43	102.71	86.04	6.57

Total absence days per FTE by age group and year. No healthcare assistants under 30 years were employed in 2018; data for this group are therefore not reported for 2018. *For age group <30, baseline year is 2019 because no employees were present in 2018; Δ refers to 2023–2019. For other age groups, baseline year is 2018.

Table 4. Distribution of absence types among nurses under 30 years, AOUP 2018–2023

Absence grouping	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**Δ 2023-2018**
Vacation	21.85	24.20	22.72	24.77	23.73	31.56	9.72
Sickness	3.76	5.10	4.52	3.87	10.74	6.64	2.88
Injury	0.20	0.46	0.17	0.93	0.21	0.33	0.13
Maternity leave	11.85	8.61	13.92	9.14	8.52	20.59	8.74
Paid leave	2.26	2.49	1.72	1.69	3.11	4.41	2.15
Unpaid leave	13.01	2.79	1.07	1.23	2.49	2.44	-10.57
Covid	-	-	2.38	0.86	3.78	0.11	0.11

Mean number of absence days per FTE by type of absence. The largest increases were observed for vacation, maternity leave, and sickness days.

healthcare assistants (OSS) and nurses (*IRR = 1.04; p = 0.47*). Overall, the regression confirmed that year and age are the main determinants of absence trends. The 2022 peak represented the only significant temporal increase, while younger workers (<30 years) had lower standardized absence rates relative to their exposure, despite higher absolute absence counts observed in the descriptive analysis. This suggests that the apparent rise among younger cohorts largely reflects workforce expansion and demographic composition, rather than a higher individual propensity for absence.

Focus on the paid leave days grouping

Within the broader category of paid leave days, it was possible to identify absences taken under Italian Law 104/1992, which allows employees to take paid leave to assist family members with severe disabilities or for their own certified condition. As shown in Table 5, the average number of days of Law 104/1992 leave per FTE was 3.66 in 2018, 3.83 in 2019, 3.76 in both 2020 and 2021, 3.65 in 2022, and 4.02 in 2023. These figures indicate a generally stable trend over the six-year period, with a modest increase of 0.36 days per FTE (+9.8%) between 2018 and 2023. The overall rise in the paid leave category is therefore attributable to other types of absences. A detailed breakdown revealed that the largest percentage increase concerned leave for personal reasons, which rose from 0.87 to 1.62 days per FTE (+86.7%). This change is plausibly linked to the revision of the National Collective Labor Agreement (CCNL, 2 November 2022), which removed the requirement for employees to provide specific documentation when requesting personal leave. Smaller but consistent increases were observed for study leave (+21.2%), leave for medical visits and treatments (+31.7%), and strike/union activities (+39.2%). The contribution of other minor categories (missions,

Table 5. Variation in paid leave days by type, AOUP 2018–2023

Absence grouping	2018	2023	Δ 2023–2018	%variation
Law 104	3.66	4.02	0.36	9.80%
Leave for study	0.71	0.87	0.15	21.20%
Strike/Public and union positions	0.21	0.29	0.08	39.20%
Leave for medical visits and treatments	0.14	0.19	0.05	31.70%
Various leave for personal reason	0.87	1.62	0.75	86.70%
Other (Mission/Business trip and Testimony)	0.06	0.07	0.01	17.60%
Total paid leave	**5.66**	**7.06**	**1.40**	**24.8%**

Average number of absence days per Full-Time Equivalent (FTE) for each type of paid leave days, with absolute (Δ 2023–2018) and percentage variation. "Law 104/1992" refers to paid leave for workers with certified disability or family care needs. The increase in personal leave coincides with changes introduced by the National Collective Labor Agreement (CCNL, 2 November 2022).

testimony) remained negligible. Overall, these findings indicate that the apparent rise in the paid leave category is largely explained by regulatory changes rather than by shifts in employee behaviour.

Discussion

This study provides a comprehensive analysis of absence patterns among healthcare staff at the Padua University Hospital (Azienda Ospedale–Università Padova, AOUP) between 2018 and 2023. To our knowledge, it is one of the first large-scale investigations in Italy to examine standardized absence rates over a multi-year period in a major hospital setting. The management of staff absences—particularly in a context of persistent workforce shortages—represents a major challenge for hospital administrations. The findings of this study highlight the complexity of this phenomenon and align with international evidence showing that the COVID-19 pandemic and structural pressures on healthcare systems have significantly influenced absence behaviours and overall workforce sustainability.

General trend of absences

Over the six-year period examined, the overall number of absence days among AOUP staff showed a moderate upward trend, with a clear temporary peak in 2022. When standardized to Full-Time-Equivalent (FTE) days, the total absence rate increased from 13.5 to 14.3 days per 100 FTE-days between 2018 and 2023, reaching its highest value in 2022 (18.99 per 100 FTE-days). This corresponds to a temporary reduction of approximately 130 FTEs in active service during that year. The increase was mainly attributable to sickness-related absences and paid leave days, while vacation days remained relatively stable. This trend mirrors a phenomenon observed in many international healthcare systems, where the COVID-19 pandemic produced a sharp but transient rise in absence rates. Before the pandemic, countries such as Sweden and Canada reported absence rates between 5% and 10%, mostly related to stress, physical strain, and burnout (9). In Canada, nurses accumulated on average more than 20 absence days per year, often linked to excessive workloads and insufficient organizational support, while in Sweden, increased absence was associated with job dissatisfaction and reduced quality of care (9). During the pandemic, absenteeism surged worldwide, with reported peaks ranging from 5.8 to over 30 days per absence period in high-exposure departments such as intensive care units and emergency services (10). At AOUP, 2022 represented the most critical year, with a marked increase in sickness absences (+5.7 days per FTE compared to 2018) and a concurrent decline in vacation use, suggesting that fatigue and post-pandemic recovery may have influenced absence behaviours. Following this peak, absence rates gradually declined, although they remained slightly above pre-pandemic levels, consistent with the literature describing persistent burnout, psychological overload, and increased workload intensity among healthcare workers (9, 10).

Absences by type

Between 2018 and 2023, illness and injury remained the leading causes of absence among AOUP staff, consistent with international reports identifying musculoskeletal and stress-related conditions as the main drivers of absenteeism in healthcare settings (5,11). The sharp rise observed in 2022, followed by a gradual normalization, suggests that pandemic-related physical and psychological strain temporarily amplified these categories. The paid leave days category increased by nearly 25% over the study period, reflecting a broader need for flexibility in reconciling professional, personal, and family demands. Within this category, absences taken under Law 104/1992—which protects workers assisting relatives with severe disabilities—remained stable, while other types of paid leave, particularly for personal reasons and medical visits, showed the greatest growth. These changes likely stem from both regulatory adjustments—such as the 2022 revision of the National Collective Labour Agreement (CCNL), which simplified documentation requirements—and the persistence of work-related stress after the pandemic. Rather than indicating disengagement or reduced commitment, the increased use of personal and medical leave should be interpreted as a coping strategy to manage workload intensity, fatigue, and emotional burden. This aligns with European evidence that greater absence flexibility can mitigate burnout and help maintain long-term workforce sustainability (11). Overall, the evolution in absence types highlights a shift from predominantly health-related absences to a more complex pattern encompassing both well-being preservation and family-care obligations, emphasizing the need for organizational policies that support staff recovery and work–life balance.

Absences by age group

The analysis by age group highlights a distinctive pattern among younger nurses, who showed the most pronounced increase in absence days during the study period. This finding is consistent with international studies, such as Krane et al. (12), which reported higher rates of sickness absence among healthcare workers aged 20–29 compared with older colleagues. Similarly, Scandinavian data document a 39% to 54% increase in absences among the youngest age groups, confirming that age remains a complex determinant of absenteeism. At the same time, the multivariable analysis indicated that nurses under 30 years of age had the lowest adjusted incidence rate ratio of absence days (IRR ≈ 0.47) compared with the 30–39 age group; this apparent discrepancy with the descriptive findings reflects the distinction between absolute absence levels and adjusted absence rates (with vacation excluded), as well as the choice of the reference category. Rather than reflecting reduced motivation, the higher absence levels among younger staff likely mirror the challenges of professional transition, including adaptation to high workload, irregular shifts, and emotionally demanding environments. In early career stages, limited autonomy and coping resources may amplify the need for recovery periods, resulting in higher use of paid leave days or health-related leave. This interpretation aligns with evidence linking early-career absenteeism to occupational stress and role adjustment rather than to attitudinal factors (14). Promoting supportive onboarding processes, mentorship, and interventions addressing workload distribution may therefore help mitigate the risk of early burnout and foster long-term retention in the profession. Overall, the age-related gradient in absences underscores that younger healthcare workers represent both a vulnerable and strategically important group. Addressing their work–life balance and well-being is essential to sustain a resilient hospital workforce in the coming years

Absenteeism as an indicator of job dissatisfaction

Absenteeism is often considered an indirect indicator of job dissatisfaction and adverse working conditions, reflecting stress, excessive workload, unsafe environments, and burnout among healthcare professionals. Studies show that psychological distress represents a major component of work absences: according to Rosenkoetter (15), anxiety, depression, and other mental health disorders account for nearly one-quarter of all sickness-related absences. In 2022 alone, approximately six million working days were lost due to mental health problems among healthcare staff. Dejours (16) interprets absenteeism as a defensive response to

unsatisfactory organizational contexts—an attempt to preserve personal well-being when work demands exceed coping capacity. This perspective aligns with evidence linking staff shortages, work overload, and emotional exhaustion to increased absence rates. Recent European surveys underline the magnitude of this phenomenon: in Belgium, 44% of nurses in 2022 declared an intention to leave the profession, and 27% planned to move to a different sector. These findings reinforce that absenteeism should be viewed not merely as a productivity issue but as a signal of organizational strain, highlighting the need for preventive strategies focused on mental health support, workload management, and a safer, more sustainable work environment.

Implications of staffing shortages

Staff shortages in healthcare systems are a persistent and pressing challenge worldwide. The aging population and the growing prevalence of chronic conditions have created a paradoxical situation in which the demand for nurses continues to rise while the supply steadily declines (17). In Italy, the shortage is particularly critical: with an average of 5.06 nurses per 1,000 inhabitants, the country lags far behind the OECD average of 9.9 and countries such as Finland (18.9) and Norway (18.8). In response, the Veneto Region launched in 2024 a strategic plan to counteract workforce shortages (3), addressing several contributing factors: reduced attractiveness of healthcare professions, delays in recruitment and public competitions, unexpected resignations unrelated to retirement, and an aging workforce—about 50% of nurses are already over 50 years old. Beyond demographic and motivational factors, workforce shortages in the Italian National Health Service are also sustained by structural and procedural constraints in hiring practices. Recruitment through public competitions is often slow and fragmented, delaying staff replacement and limiting mobility between institutions (18, 19). Moreover, the increasing reliance on fixed-term contracts and external service providers, particularly for non-medical personnel, reduces job stability and discourages long-term retention (20). These systemic inefficiencies, combined with low wage competitiveness, contribute to the persistent imbalance between workforce supply and demand. The upcoming "pension hump," representing the retirement of nearly half of the current workforce within the next decade, is expected to further exacerbate this shortage. Evidence from international studies, including Burmeister et al. (21), demonstrates a clear association between inadequate staffing levels, increased workload, and higher rates of absenteeism. Chronic understaffing leads to extended shifts, fatigue, and psychological stress, creating a self-perpetuating cycle that further weakens service capacity. To break this cycle, it is essential to integrate absence monitoring into human resource planning. The average number of absence days per FTE should be treated as a key workforce indicator, enabling health organizations to anticipate staffing needs and ensure safe coverage levels. Stratifying absence trends by age and professional profile can support predictive modelling for workforce sustainability. Such approaches can guide the definition of minimum staffing thresholds, promote targeted interventions for staff well-being, and ultimately safeguard the quality of patient care.

Limitations

This study has several limitations. First, it is based on administrative data that do not include clinical or psychosocial information on the reasons for absence. Second, the incorporation of another hospital in 2020 may have introduced structural heterogeneity, although compositional analysis suggests limited confounding. Third, the descriptive design precludes causal inference, and residual effects of the 2022 CCNL policy change cannot be fully separated from post-pandemic recovery dynamics. Finally, the findings pertain to a single institution and may not be generalizable to other healthcare settings.

Ethic Approval: The study was approved by the Ethics Committee of the University Hospital of Padua (Azienda Ospedale-Università Padova - AOUP) (reference number: 549n/25).

Conflicts of Interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

Author's Contribution: Conceptualization, M.D., M.Z. and V.B.; data curation, C.D., E.F., E.M. and E.M.; formal analysis, C.D., E.F., E.M., E.M.; investigation, C.D., E.F., M.D. and M.Z.; methodology, C.D., E.F., E.M. and V.B.; project administration, C.D., E.F., M.D., M.Z. and V.B.; software, E.M.; supervision, L.S., N.T., I.D., E.M., F.D., M.T., F.P., S.P. and V.B.; validation, M.D., L.S., N.T., I.D., E.M., F.D., M.T., F.P., M.Z. and V.B.; visualization, C.D., E.F. and E.M.; writing—original draft, C.D. and E.F.; writing—review and editing, M.D., E.M., M.Z. and V.B..
All authors have read and agreed to the published version of the manuscript.

Declaration on the Use of AI: None.

References

1. World Health Organization (WHO). State of the world's nursing 2020: Investing in education, jobs and leadership. WHO; 2020. Available from: https://www.who.int/publications/i/item/9789240003279 [Last accessed: 2025 Feb 16].
2. International Council of Nurses (ICN). International Council of Nurses calls for urgent action to address global nursing shortage. ICN; 2020. Available from: Https://www.icn.ch/news/international-council-nurses-calls-urgent-action-address-global-nursing-shortage [Last accessed: 2025 Feb 16].
3. Regione Del Veneto. Deliberazione della Giunta Regionale n. 960 del 13 Agosto 2024 Approvazione del Piano regionale di contrasto alla carenza di personale del Servizio socio sanitario regionale del Veneto. Available online: https://bur.regione.veneto.it/BurvServices/pubblica/DettaglioDgr.aspx?id=536994 [Last accessed: 2025 Feb 16].
4. Paringer L. Women and absenteeism: health or economics? Am Econ Rev. 1983 May;73(2):123-7. PMID: 5259759.
5. Palmer W, Rolewicz L. All is not well: Sickness absence in the NHS in England. Nuffield Trust; 2023. Available from: https://www.nuffieldtrust.org.uk [Last accessed: 2025 Feb 16].
6. Office for National Statistics, UK. Sickness absence in the UK labor market: 2022. Office for National Statistics; 2023 April 26. Available from: https://www.ons.gov.uk [Last accessed: 2025 Feb 16].
7. Rabarison KM, Lang JE, Bish CL, Bird M, Massoudi MS. A Simple Method to Estimate the Impact of a Workplace Wellness Program on Absenteeism Cost. Am J Health Promot. 2017 Sep;31(5):454-455. Epub 2017 Aug 21. PMID: 29611920; PMCID: PMC5724963.
8. Kisakye AN, Tweheyo R, Ssengooba F, Pariyo GW, Rutebemberwa E, Kiwanuka SN. Regulatory mechanisms for absenteeism in the health sector: a systematic review of strategies and their implementation. J Healthc Leadersh. 2016 Nov 9;8:81-94. doi: 10.2147/JHL.S107746.
9. Brady HD, McGrath D, Dunne CP. Sick Leave Determinants in the Healthcare Sector (Part I): A Review of Contextual Factors. Brown J Hosp Med. 2023 Jan 1;2(1):57688. doi: 10.56305/001c.57688.
10. Maltezou HC, Ledda C, Sipsas NV. Absenteeism of Healthcare Personnel in the COVID-19 Era: A Systematic Review of the Literature and Implications for the Post-Pandemic Seasons. Healthcare (Basel). 2023 Nov 12;11(22):2950. doi: 10.3390/healthcare11222950. .
11. European Foundation for the Improvement of Living and Working Conditions (Eurofound). Psychosocial risks to workers' well-being: Lessons from the COVID-19 pandemic. Luxembourg: Publications Office of the European Union. 2023 (European Working Conditions Telephone Survey; 2021 series). doi: 10.2806/350964.
12. Krane L, Johnsen R, Fleten N, Nielsen CV, Stapelfeldt CM, Jensen C, et al. Sickness absence patterns and trends in the health care sector: 5-year monitoring of female municipal employees in the health and care sectors in Norway and Denmark. Hum Resour Health. 2014 Jul 8;12:37. doi: 10.1186/1478-4491-12-37. .
13. Baydoun M, Dumit N, Daouk-Öñyry L. What do nurse managers say about nurses' sickness absenteeism? A new perspective. J Nurs Manag. 2016 Jan;24(1):97-104. doi: 10.1111/jonm.12277.
14. Ticharwa M, Cope V, Murray M. Nurse absenteeism: An analysis of trends and perceptions of nurse unit managers. J Nurs Manag. 2019 Jan;27(1):109-116. doi: 10.1111/jonm.12654.
15. Rosenkoetter MM, Nardi DA. American Academy of Nursing Expert Panel on Global Nursing and Health: white paper on Global Nursing And Health. J Transcult Nurs. 2007 Oct;18(4):305-15. doi: 10.1177/1043659607305188.
16. Dejours C. A loucura do trabalho: estudo de psicopatologia do trabalho. Psicologia e Saude em Debate. 5.ed ampliada. São Paulo: Cortez-Oboré; 1992. Available from: https://taymarillack.wordpress.com/wp-content/uploads/2018/03/359097901-a-loucura-do-trabalho-estudo-de-psicopatologia-do-trabalho-christophe-dejours-pdf.pdf [Last accessed: 2025 Feb 16].
17. National Academies of Sciences, Engineering, and Medicine; National Academy of Medicine; Committee on the Future of Nursing 2020-2030. Flaubert JL, Le Menestrel S, Williams DR, Wakefield MK, eds. The Future of Nursing 2020-2030: Charting a Path to Achieve Health Equity. Washington (DC): National Academies Press (US). 2021 May 11. doi: 10.17226/25982.
18. OECD; European Observatory on Health Systems and Policies. Italy: Country Health Profile 2023. State of Health in the EU. Paris: OECD Publishing; 2023. doi: 10.1787/633496ec-en.
19. WHO European Observatory on Health Systems and Policies. Italy - 4.2 Human resources. Health Systems Response Monitor (HSRM), 2024. Available from: https://eurohealthobservatory.who.int. [Last accessed: 2025 Oct.23].

20. Ministero della Salute. Il personale del sistema sanitario italiano. Anno 2021. Roma: Ministero della Salute; 2024.
21. Burmeister EA, Kalisch BJ, Xie B, Doumit MAA, Lee E, Ferraresion A, et al. Determinants of nurse absenteeism and intent to leave: An international study. J Nurs Manag. 2019 Jan;27(1):143-153. doi: 10.1111/jonm.12659. .

Annex

Table S1. Standardized absence rates (days per 100 FTE-days) and 95 % confidence intervals, AOUP 2018–2023

Year	100 FTE DAYS	IC 95%
2018	13.52	*13.46; 13.60*
2019	13.00	12.93; 13.07
2020	13.62	13.56; 13.69
2021	14.64	14.57; 14.71
2022	18.99	18.92; 19.07
2023	14.25	14.19; 14.32

Absence rates standardized to 100 Full-Time-Equivalent (FTE) working days per year, excluding vacation days. One FTE = 260 working days/year. Values are reported with 95 % confidence intervals. These data correspond to the overall trend shown in Figure 1.

Table S2. Likelihood ratio tests for year, age group, and professional profile (Negative Binomial GLM)

	χ^2	df	p
Year	19.0	5	0.002
age group	73.3	4	<0.001
professional profile	0.530	1	0.47

χ^2 tests for the significance of each independent variable in the multivariable model. Deviance/df = 1.12 (adequate fit)

Table S3. Incidence Rate Ratios (IRR) and 95% Confidence Intervals from the Negative Binomial GLM

	Exp(b)	95%CI	p
2019 vs 2018	0.916	0.749; 1.119	0.389
2020 vs 2018	0.885	0.725; 1.081	0.231
2021 vs 2018	1.063	0.870; 1.298	0.551
2022 vs 2018	1.294	1.059; 1.580	0.012
2023 vs 2018	1.059	0.867; 1.294	0.573
Age group 40-49 vs 30-39	0.620	0.519; 0.831	<0.001
Age group 50-59 vs30-39	0.696	0.583; 0.831	<0.001
Age group >60 vs 30-39	0.804	0.673; 0.959	0.016
Age group <30 vs 30-39	0.466	0.389; 0.560	<0.001
Healthcare assist. vs nurse	1.043	0.931; 1.169	0.465

Model adjusted for year, age group, and professional profile. Reference categories: year = 2018; age group = 30–39 years; professional profile = nurses. Offset = ln (FTE).