Impact of the COVID-19 pandemic on sickness absence rates in healthcare workers: A retrospective cohort study in a Spanish hospital

Final Degree Project

Human Biology, 2019-2023

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Keywords: Sickness absence, healthcare workers (HCWs), COVID-19 pandemic, occupational determinants of health, working conditions.

Character count: 22,989

Summary

The COVID-19 pandemic has affected the working conditions and social demands of healthcare workers (HCWs). This study focuses on analyzing sickness absence rates among HCWs in a Spanish hospital from 2018 to 2022, considering sociodemographic and occupational variables. Logistic regression models have allowed to assess the correlation between work variables and the probability of having a sickness absence each year.

The results show that sickness absence rates increased significantly in late 2021 and remained elevated throughout 2022. Despite all workers suffering significant increases in incidence rates, female HCWs consistently had higher rates compared to males. Occupational category was found to be a key determinant, with nurse aides experiencing the highest rates in post-pandemic years. Additionally, nurses and nurse aides had greater odds of having sickness absences compared to doctors. Having worked in critical care or the emergency room during the pandemic was also associated with higher incidence rates.

Overall, the findings highlight the impact of working conditions on HCWs' health and the need to address the underlying systemic issues in healthcare systems. Understanding the occupational determinants of sickness absence can help in developing strategies to improve the well-being of HCWs and ensure a healthy and stable workforce.

Introduction

In 2020 the COVID-19 pandemic put healthcare systems across the world under severe pressure, disrupting their ability to provide adequate care to both COVID-19 and non-COVID-19 patients. The pandemic has surfaced underlying systemic problems in European healthcare systems, with the OECD and the WHO agreeing on the need to take immediate action[1,2]. For years, healthcare systems have faced challenges due to a continuously ageing population, an increase in chronic conditions, and a recurring lack of resources, together with persistent understaffing due to difficulties in the retention, education, and employment of healthcare workers (HCWs)[2,3]. Following the 2008 economic downfall, austerity measures were implemented across Europe's public services. In Spain, public spending on healthcare was cut by twelve billion euros from 2009 to 2015, severely affecting the quality of service and HCWs' working conditions[4–6]. The pandemic, along with the previous budget cuts, has aggravated these issues, with the EU now lacking around 1 million doctors and experiencing a severe "brain drain"[7].

Working conditions can affect HCWs' health[8], with studies linking job control and stability, psychosocial demands, and work organization to several occupational health problems[9]. Since the 2008 economic crisis, working conditions in Spain have worsened across all sectors, with HCWs suffering longer work shifts and higher workload and temporality[10,11]. At the frontline, HCWs have been suffering the effects of these structural issues for years, which has left long-lasting aftereffects on their health. In Western countries, HCWs have always suffered a high incidence of work-related injuries, with female HCWs being the most affected group in 2020, above those in any other industry[12]. Among the leading causes of injuries in HCWs, we can find pathogens and musculoskeletal injuries, with healthcare being the sector with the highest incidence of the latter[13]. Furthermore, HCWs were already at a high risk of suffering from mental health disorders before the pandemic, such as anxiety, pharmacological addiction, suicide, or depression[14].

Following the COVID-19 pandemic the incidence of mental health disorders has been on the rise among HCWs worldwide[15,16]. Previous outbreak events, like SARS or MERS, have already shown how these situations can impact HCWs' mental health, leading to a higher prevalence of anxiety or post-traumatic stress disorder syndrome[17,18]. In the early months of the pandemic, HCWs in Spain and around the world already showed a high prevalence of depression and professional burnout, especially among those in emergency and critical-care units[19,20]. Amongst the risk factors associated with mental disorders due to the COVID-19 pandemic, age, gender, and job role were found to be the most important[21,22]. Vastly related to the incidence of mental health disorders in HCWs are working conditions, which, as previously mentioned, have worsened in the last few years. Some studies have linked impoverished working conditions with depression, anxiety, burnout, and an overall worse mental health in the general population and HCWs[23–26].

Underlying external socioeconomic determinants of health have always played a key role in occupational health, with gender, age, and economic status affecting the health of workers[27,28]. HCWs include a variety of job roles, each with its unique tasks. Ranging from doctors and nurses to nurse aides and orderlies, the healthcare work environment is especially hierarchical, with job roles deeply affecting working conditions and precariousness, which emphasizes health inequalities[29]. Moreover, there is widespread gender disparity amongst healthcare-providing services, with women occupying 90% of nurse aides' positions but only 25% of leadership positions, despite accounting for 70% of the workforce[30]. Female HCWs have worse working conditions and overall worse health indicators[31], making gender perspective essential when analyzing working conditions.

Sickness absence rates have long been used as measurements of ill health proving to be an indicator that integrates social and work demands and health[32,33]. The Whitehall II study already identified lower employment grades and educational levels as risk factors for sickness absences, with female unskilled workers being the most at-risk collective. Other occupational factors are also important, like employment contract type and work shift[34]. This makes sickness absence rates great tools for measuring the overall health of HCWs while accounting for social determinants of health.

Estimating HCWs' health has become urgent given the importance of maintaining a healthy and stable workforce to ensure a functioning system. This study aims to analyze sickness absence rates among a Spanish hospital's workforce from 2018 to 2022, while considering sociodemographic and occupational variables. Sex and occupational variables are believed to be key determinants of HCWs' health in the current setting, so their implication will be thoroughly assessed. The hospital setting that will be analyzed is the Parc Salut Mar (PSMar) from Barcelona (Spain), a multi-facility healthcare center. Moreover, the correlation between occupational variables, such as occupational category, shift, or facility, and the probability of suffering a sickness absence over the last five years will also be explored.

Results

Descriptive and demographic analysis

As shown in *Table 1* during the 4 years and 8-month period, a total of 8,173 individuals were employed by the PSMar, with 72.5% (5,932) being female and 27.5% (2,250) male. Almost 70% (5,533) of the total cohort worked at the Hospital del Mar, the main facility. The other health centers, the FÒRUM, the CAEMIL, and the Hospital de l'Esperança, had around 10% of the total cohort (581, 854, and 750, respectively). When looking at the occupational category, doctors accounted for 13.6% (1,111) of the total, and nurses for 27% (2,205). Nurse aides and orderlies accounted for 23.5% (1,918) and 9.6% (781), respectively. Additionally, 10.3% (843) of the cohort were residents or trainees and 16.1% (1,315) belonged to administrative roles. When looking at age, 43.3% (3,535) were in the 18-29 age range and 38.6% (3,152) in the 30-49 range. Only 18.5% (1,484) of the cohort were above 50 years of age.

In *Table 1* a descriptive analysis stratified by sex and year can also be found, where the distribution of men and women along the previously mentioned variables can be seen. Additionally, the medical department has been added, where it can be observed that every year, around 12-15% of females and males worked in critical care or the emergency room, noting that the number of workers increased considerably since 2020. When looking at the distribution of the age and shift variables, no significant differences stand out between males and females. However, significant differences can be detected when observing the occupational category distribution. The majority of women (61%) were nurses or nurse aides, while only 12.8% occupied physician roles. In comparison, 28.1% of male workers were doctors, and only 29.6% nurses or nurse aides. In *Supplementary Table 1* it is shown the % of women and men in each occupational category, detecting that women accounted for 56-57% of doctors and 84-87% of both nurses and nurse aides every year.

When considering the temporal evolution of the sociodemographic variables in *Table 1*, the only variable that experienced a significant change throughout the observation period is age. In both men and women, there was a 7.6% and 5.8% increase, respectively, in the workers belonging to the 18-29 age range.

Incidence density rates

Figure 1A shows the annual incidence rate for 2018 (0.64 cases/person-years), which had almost doubled in 2022, suffering an 84.1% increase to 1.18 cases/person-years. In 2021 the annual incidence density was 0.85 cases/person-years, indicating that the spike in sickness absence rates happened in late-2021/early-2022. As displayed in *Figure 1B*, incidence density rates started increasing in October 2021, when incidence density jumped from 0.68 in September to 1.54 cases/person-years. For eight consecutive months, incidence density rates remained above 1.0 cases/person-years, something that had not happened before during the observation period. Pre-pandemic years started with high incidence rates in January and February, which in the following months stabilized around 0.4-0.7 cases/person-years.

Table 2 shows monthly incidence density rates segregated by sex. Generally speaking, higher incidence rates among women could be detected, which showed up to a 0.3-0.4 cases/person-years difference from men. When looking at October 2021 it can be seen that both male and female workers experienced an increase in incidence density, with females suffering a 111.9% rise from September 2021 and males a 286.8% climb. Throughout the eight months of 2022, all worker groups maintained elevated levels of incidence rates, with an average increase of 99.1% for females and 118.4% for males in comparison to the same months in 2018. Despite lacking the data from September 2022 to December 2022, it can be observed that in June 2022 incidence rates started to slowly go down, while still being higher than in previous years.

Displayed in *Figure 2* are incidence density rates segregated by sex and occupational category. Except for residents/trainees, in 2022 all occupational groups experienced an increase in sickness absence rates, both men and women. Focusing on women (*Figure 2A*), nurse aides suffered the steepest increase in 2022, being the only occupational group above 2.0 cases/person-years. Female nurse aides experienced a 103% increase from 2018 and a 45.9% increase from 2021. Nurses presented a similar increase, with an 81.6% increment since 2018. In pre-pandemic years female doctors showed incidence rates around 0.3-0.4 cases/person-years, and in 2022 they presented a 36.6% hike from 2018. Orderlies and administration staff also suffered significant surges in incidence rates. When looking at male workers (*Figure 2B*) the main difference is in the orderlies occupational group, which experienced the highest incidence rate in 2022 among all other male groups. Male orderlies showed a 103.2% increase since 2018. When focusing on nurse aides it is seen that overall, they had significantly lower rates than females, with male nurse aides seeing an incidence rate 25% lower than females in 2022. However, the increase since 2018 was 118.8%, similar to the female group. Male doctors also had lower basal incidence rates, and the increase from 2018 to 2022 was 14.8%. The nurse and administration occupational groups were highly similar to the female ones. Residents/trainees showed similar incidence rates to doctors among both females and males.

Figure 3A displays incidence density rates for each medical department. It can be seen that workers in critical care or the emergency room started showing significantly higher incidence rates than other workers in 2021, both among male and female workers. *Figures 3B* and *3C* display the average length of sickness absence spells for each occupational category. It can be seen that, despite a slight increase in 2020 in some occupational categories, the length of sickness absences did not increase in the same fashion that incidence rates did. Moreover, some job roles like nurses, nurse aides, and doctors had lower average lengths in 2021-2022 than in 2018.

Binary logistic regression

In *Tables 3* and *4* are displayed, for each predictive variable, the Odds Ratios (ORs) as estimated in the logistic regression models. The ORs are expressed as the predicted probability of belonging to the "workers with one or more sickness absence" group in comparison to the "workers with no sickness absence" group each year. The data is stratified by year and by sex (*Tables 3 and 4*).

When looking at the ORs of women (*Table 3*) obtained in model 3, occupational categories and age were the most important predictive variables, given that they attained statistical significance most of the time. In comparison to doctors, nurse aides presented the highest OR in 2022, 4.03 (3.07-5.28), a 53.7% increase from 2018. Additionally, in 2022 the odds that nurses had a sickness absence were 2.30 (1.77-3.00), a 23.3% increase from 2018. Both nurses and nurse aides suffered a progressive increase in their OR, with 2021 having the highest values, 2.48 (1.89-3.25) and 5.04 (3.81-6.66), respectively. Female orderlies also showed statistical significance in most of the years but, despite a considerable increase from 2020 to 2021, no notable changes were observed across time, as ORs in 2022 were lower than in 2018. Administrative roles did attain statistical significance sometimes but showed no notable differences between the years. Residents rarely showed statistical significance.

As expected, age is an influential predictor variable, showing that older workers had greater odds of experiencing a sickness absence. Notably, the ORs decreased over the years, with age becoming less and less of a risk factor. Workers in the 50-70 age group experienced a 53.2% drop in the ORs from 2018 to 2022. The facility appears to be a weak predictor variable, as it showed no association with the probability of having a sickness absence spell. The work shift shows that people working on other shifts aside from day or night had considerable protection against sickness absences. Lastly, the medical department seemed to not have any association with the outcome variable until 2021, one year after the start of the pandemic. In 2021 and 2022 workers in critical care and the emergency room had greater odds of having a sickness absence, 1.65 (1.34-2.03) and 1.31 (1.06-1.62), respectively.

As for the ORs among male workers (*Table 4*), it can be seen that occupational category is again the most important predictor variable, maintaining statistical significance across the four models. In model 3 it can be seen that nurses and nurse aides had greater odds than doctors of developing a sickness absence in 2022, 5.56 (3.49-8.87) and 6.30 (3.86-10.30), respectively. Comparing 2022 to 2018, male nurses suffered a 97.5% increase, while nurse aides experienced a 101.1% climb. It is notable that, overall, male workers in these occupational categories had higher ORs than females. Male orderlies showed strong statistical significance in their ORs. However, in contrast to females, they had considerably heightened ORs in 2021 and 2022, 5.06 (3.24-7.91) and 5.81 (3.74-9.03), respectively. Administrative roles also showed slightly increased OR, but no notable progression could be detected. Again, residents rarely showed statistical significance. The facility and shift variables showed no notable differences with the female group. Again, the medical department variable behaved the same as in female workers, with critical care and emergency room being significant risk factors in 2021 and 2022.

For both male and female workers, all years of model 3 have a significant *P-value* and a Hosmer-Lemeshow test higher than 0.05, proving the models to have an acceptable goodness-of-fit.

Discussion

This observational retrospective cohort study aimed to examine sickness absence rates among PSMar HCWs between 2018 and 2022, and the effect the COVID-19 pandemic had on them. The results obtained point out to the COVID-19 pandemic causing an increase in sickness absences among HCWs, which could be explained by alterations in either the working conditions, working environment or social factors that have led to a worsening in HCWs' health, emotional exhaustion, and burnout. In September 2021 sickness absence incidence rates saw a sudden 125.6% increase in just one month. For the rest of the observation period, sickness absence rates remained at considerably higher levels than in previous years, with incidence rates in 2022 being 84.1% higher than in 2018. This phenomenon occurred in both male and female workers, with women generally suffering higher rates across the entire observation period. Nurse aides and nurses were the groups with the highest pre-pandemic rates and also suffered the highest increases since 2020, and male orderlies were also among the groups with highest rates after 2020. On the other hand, doctors experienced the lowest increases after the pandemic. Additionally, workers in critical care and the emergency room showed higher increases since 2020 than all other departments. This study also intended to assess the association between occupational variables and the odds of having a sickness absence. The occupational category was the strongest predictive variable, with nurses and nurse aides of both sexes and male orderlies having around 2.13-6.30 (1.52-10.3) higher odds than doctors of having a sickness absence in 2022.

The current trend is affecting different types of HCWs differently, with nurses, nurse aides and orderlies suffering the highest rates. Nurses and nurse aides have a higher risk factor of having occupational health problems due to the nature of their work and their working conditions[35], hence why they showed already the highest levels among all other groups in the pre-pandemic period. Across Europe, HCWs are subjected to higher workloads, traumatic COVID-19-related experiences, mobbing and poor economic retribution, leading to 37-49% of HCWs suffering from burnout[36,37]. Recent scientific literature has shown that nurses are the ones suffering the most from precarious working conditions derived from the pandemic[25,29], which could explain why they are the ones that suffered the highest increases. Additionally, nurses and nurse aides were the groups most in contact with patients during the pandemic, which could lead to mental health problems due to traumatic work-related experiences[36].

One key observation of this study is the importance of the medical department. Several reports have shown that, following the COVID-19 pandemic, the HCWs in critical care or emergency rooms were the most at-risk group of developing mental health problems or burnout[20,22,37]. Incidence rates among workers in those two medical departments started increasing in 2021, with 2022 rates doubling those in 2018 and 2019. ORs also showed that during the post-pandemic period all workers in those departments displayed higher odds of having a sickness absence spell than in pre-pandemic years. This would align with the hypothesis that burnout and mental health problems are behind this sudden increase.

One of the aims of this study was to assess the implication of gender in the development of a sickness absence spell. The results have shown that women doctors, nurse aides, residents and administration staff suffered from higher incidence density rates than men. Other studies had already shown that women, specifically those in underpaid positions, suffered more from mental health problems during the COVID-19 pandemic[38].

The binary logistic regression has also provided insight into the correlation between the occupational variables and the odds of having a sickness absence. The pandemic has left HCWs at heightened odds of suffering health problems. Vulnerable job roles, such as nurses and nurse aides, suffered from almost double the odds in comparison to the years before the pandemic. Surprisingly, male workers showed higher odds than females, with male orderlies being the second most at-risk group of the entire cohort. It can be seen that the influence of sociodemographic variables like age is becoming weaker, with occupational variables becoming more influential. This lines up with the hypothesis that poor working conditions, which affect healthcare workers in different ways depending on their job role, might be behind this phenomenon.

To understand the reason behind this increase in sickness absence rates, the average length of sickness absence spells can shed some light on the matter. Previous studies have reported that mental health sickness absences tend to be longer than other sickness absences, with an average length of 59 days[39]. The mean length of sickness absences in the PSMar HCWs tends to be considerably lower than that. Moreover, no significant increases can be observed across the observation period, suggesting that some other factors could be influencing HCWs' health aside from mental health problems. Similar existing studies have suggested alternative explanations, such as the delays in diagnosis of certain diseases in 2020, leading to higher incidence rates now, or the failure to identify COVID-19 cases as such in 2022[40].

Limitations, strengths and further research

The main limitation of this study is the impossibility of accessing the reason for sickness absence spells due to data protection laws. Additionally, data collection stopped in August 2022, so further data would need to be collected to characterize this trend in the following months. In addition, by classifying the number of sickness absences in a dichotomic variable it was not possible to distinguish those with just one sickness absence from those with more than one. Also, the regression models have been made separately by year and analyzed independently, thus removing the time series component. Extended analyses are required to further analyze this variable and the existence of previous sickness absences as a risk factor for new ones. The strength of this study lies in the reliability of data sources, which provided trustworthy administrative and health data for all PSMar HCWs. This has allowed this study to pioneer research on the health of Spanish HCWs following the COVID-19 pandemic, using a reliable indicator such as sickness absence rates. Moreover, having the exact time that each worker has been exposed, that being the days worked, allowed the incidence rates calculations to be trustworthy and robust. It becomes essential to further analyze hospital cohorts across Spain, in order to analyze the most common causes of sickness absences and understand which ones are causing this increase in incidence rates. Nonetheless, further research should not only focus on the reason for sickness absence spells but should also analyze the association between working conditions, worker satisfaction, and burnout, analyzing the evolution before and after the pandemic using time series data.

Conclusion

This article lays the foundation for further research projects, characterizing how this upward trend is taking place and which groups are more at risk. Despite the reason for this surge in sickness absences remaining unknown, it is apparent that occupational inequalities in healthcare settings are worsening this phenomenon. Urgent measures need to be implemented in order to address disparities within hospitals, aiming to reduce the impact they have on the well-being of healthcare workers and alleviate the negative health outcomes experienced by specific groups.

Materials and Methods

This longitudinal study was carried out with a retrospective cohort from the 1st of January 2018 to the 30th of September 2022, including all healthcare workers at the Parc Salut Mar (PSMar) who had been hired for at least one week. The PSMar is an aggregation of healthcare centers in Barcelona (Spain) with 450 acute beds, 33,000 annual discharges, 8 healthcare facilities, and around 4,500 workers, being a highly dynamic cohort. Personnel records were collected by the Occupational Health Department. During the 4-year and 8 months period, 8,173 individuals were employed by the PSMar.

Under Spanish law sickness absence is defined as the inability of an affiliated worker to carry out their work due to both a non-work-related or work-related injury or illness. The worker is entitled to sickness absence benefits from the Social Security system and will receive care from the national healthcare system. Sickness absences are classified between common diseases/non-work-related injuries and occupational diseases/work-related injuries. However, around 90% of sickness absences are classified as non-work-related[41]. Hence, for this study only sickness absences for common diseases/non-work-related injuries were considered. It is important to mention that since 2020, sickness absence spells caused by SARS-CoV-2 were classified under a specific category for COVID-19 cases.

Variables

Sickness absence was the outcome variable. For each worker the number of sickness absence spells, the start and end date of the sickness absence spell, and days under a sickness absence were compiled. The number of effective worked days per worker was estimated by subtracting the number of days under a sickness absence spell to the sum of the days in their contract. The number of sickness absence spells by year was re-coded as a new binary variable where all individuals with one or more sickness absences were registered as 1 and all others as 0.

For each worker, a series of occupational and sociodemographic variables were compiled. Given the high disparity in incidence rates obtained between occupational groups, the main explicative variable was occupational category (doctor, nurse, nurse aide, resident, orderly, and administration). The other variables were work shift (day, night and others), working facility (Hospital del Mar, Centre FÒRUM, Hospital de l'Esperança, Dr Emili Mira Center (CAEMIL), and others), and medical department (hospitalization, critical care, emergency room, surgery, outpatient care, central service, and administration). Medical departments were re-coded into a binary variable, with 1 being critical care and emergency departments, since they are the most at-risk group of mental health problems linked to the COVID-19 pandemic, and 0 for all others. Sex (female and male) and year (2018, 2019, 2020, 2021, and 2022) were stratification variables, and age group (18-29, 30-49, and 50-70) was used for adjustment. The type of employment contract (permanent, temporary, and others) was also registered, but for practical reasons was disregarded, given the inability to accurately compare sickness absences between permanent and temporary contracts.

For each predictor variable a reference value was chosen: doctors for the occupational category, 18-29 age range for age, Hospital del Mar for facility, day shift for shift, and all other departments aside from critical care and emergency room for the medical department.

Statistical analysis

A descriptive analysis (n and %) was conducted to characterize the population, stratified by year and sex. Additionally, a cross-table between occupational category and sex, segregated by year, was done to observe n and % of males and females in each occupational category.

Given the high dynamism of the cohort and the fact that data collection stops in August 2022, incidence rates were calculated as incidence density, as it accounts for observation period length. Incidence density rates were calculated as the number of new sickness absences/sum of all observation periods (sum of days on the employment contract of all workers minus the total days under a sickness absence spell). Incidence density rates were calculated for every month of the entire observation period. Moreover, yearly incidence density rates were calculated for each occupational category and medical department. Additionally, for each occupational category average length of sickness absence spells was calculated annually.

Finally, stratifying the dataset by year and sex, binary logistic regression models were used. The binary outcome variable was 0 (no sickness absence) and 1 (sickness absence). Four models were estimated in order to progressively add the different variables. The first model (model 0) included the occupational category and age variables. The second model (model 1) added the facility variable, the third one (model 2) the shift variable and the last model (model 3) the medical department variable. For each predictor variable Odds Ratios (ORs) with the corresponding confidence intervals (CI 95%) were calculated, and statistical significance was also described at *P-value* <

0,05. For model 3 the goodness of fit was calculated with the Hosmer-Lemeshow test and *P-value* for every year.

All statistical analyses were stratified by sex and were made using the Statistical Package for the Social Sciences (SPSS) version 28.0.

Ethics

This study has been done with completely anonymized data. Informed consent was not sought as all anonymous data collection was covered under the employment contract agreement signed by all employees. Ethics committee (CIR-IMIM) approval for this project was not sought either, as the work done was covered under previous authorization (2020-9379-I) to compile the used PSMar cohort.

Bibliography

1. OECD (OECD Health Policy Studies). *Ready for the Next Crisis? Investing in Health System Resilience.* Paris*:* OECD; 2023.

2. World Health Organization. *Global Strategy on Human Resources for Health: Workforce 2030*. Geneva: WHO; 2016.

3. World Health Organization. Regional Office for Europe. *Health and care workforce in Europe: time to act.* Geneva: WHO; 2022.

4. OECD/EU: *Health at a Glance: Europe 2014*. Paris: OECD Publishing; 2014.

5. Gea-Sánchez M, Briones-Vozmediano E, Legido-Quigley H, *et al*. *La resistencia de las enfermeras a las medidas de austeridad en el sector salud durante la crisis en España. Gac Sanit*; 2021; 35(1):42-47.

6. Vilas-Iglesias MS, Caamaño-Alegre J, Vilas-Iglesias MS, Caamaño-Alegre J. *Una investigación de caso único sobre el impacto de los recortes en la calidad asistencial de un servicio autonómico de salud. An Sist Sanit Navar*; 2020; 43(3):359-372.

7. Health-EU newsletter 250 - Focus. *Put the horse before the cart: Investing in health requires investing in health workforce*. EU – Newsletter 250. Accessible at: https://health.ec.europa.eu/other-pages/basic-page/health-eu-newsletter-250-focus_en

8. Zarska A, Avgar AC, Sterling MR. *Relationship Between Working Conditions, Worker Outcomes, and Patient Care: A Theoretical Model for Frontline Health Care Workers. Am J Med Qual*; 2021; 36(6):429-440.

9. Bernal D, Campos-Serna J, Tobias A, Vargas-Prada S, Benavides FG, Serra C. *Work-related psychosocial risk factors and musculoskeletal disorders in hospital nurses and nursing aides: A systematic review and meta-analysis. Int J Nurs Stud*; 2015; 52(2):635-648.

10. Salas-Nicás S, Moncada S, Llorens C, Navarro A. *Working conditions and health in Spain during the COVID-19 pandemic: Minding the gap. Saf Sci*; 2021; 134:105064.

11. Granero-Lázaro A, Blanch-Ribas JM, Roldán-Merino JF, Torralbas-Ortega J, Escayola-Maranges AM. *Crisis en el sector sanitario: impacto percibido en las condiciones de trabajo de las enfermeras*. *Enferm Clin*; 2017; 27(3):163-171.

12. European Union. Eurostat: Health and Safety at Work (HSW_N2_01). *European Statistics on Accidents at Work (ESAW).* Publications Office of the European Union; 2020.

13. U.S. Bureau of Labor Statistics. *Occupational injuries and illnesses resulting in musculoskeletal disorders (MSDs)*. U.S. Bureau of Labor Statistics; 2018.

14. Kim MS, Kim T, Lee D, *et al*. *Mental disorders among workers in the healthcare industry: 2014 national health insurance data*. *Ann Occup Environ Med*; 2018; 30(1).

15. Aymerich C, Pedruzo B, Pérez JL, *et al*. *COVID-19 pandemic effects on health worker's mental health: Systematic review and meta-analysis*. *Eur Psychiatry*; 2022; 65(1).

16. Van Wert MJ, Gandhi S, Gupta I, *et al*. *Healthcare Worker Mental Health After the Initial Peak of the COVID-19 Pandemic: a US Medical Center Cross-Sectional Survey. J Gen Intern Med*; 2022; 37(5):1169-1176.

17. Lung FW, Lu YC, Chang YY, Shu BC. *Mental Symptoms in Different Health Professionals During the SARS Attack: A Follow-up Study. Psychiatr Q*; 2009; 80(2):107-116.

18. Lee SM, Kang WS, Cho AR, Kim T, Park JK. *Psychological impact of the 2015 MERS outbreak on hospital workers and quarantined hemodialysis patients. Compr Psychiatry*; 2018; 87:123.

19. Jesús García-Iglesias J, Gómez-Salgado J, Martín-Pereira J, *et al*. *IMPACTO DEL SARS-COV-2 (COVID-19) EN LA SALUD MENTAL DE LOS PROFESIONALES SANITARIOS: UNA REVISIÓN SISTEMÁTICA REVISIÓN SISTEMÁTICA. Rev Esp Salud Pública*; 2020; 94:23-24.

20. Lai J, Ma S, Wang Y, *et al*. *Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. JAMA Netw Open*; 2020; 3(3).

21. Wu P, Fang Y, Guan Z, *et al*. *The Psychological Impact of the SARS Epidemic on Hospital Employees in China: Exposure, Risk Perception, and Altruistic Acceptance of Risk. Can J Psychiatry*; 2009; 54(5):302.

22. Maunder RG, Lancee WJ, Rourke S, *et al*. *Factors associated with the psychological impact of severe acute respiratory syndrome on nurses and other hospital workers in Toronto. Psychosom Med*; 2004; 66(6):938-942.

23. Laine H, Saastamoinen P, Lahti J, Rahkonen O, Lahelma E. *The associations between psychosocial working conditions and changes in common mental disorders: A follow-up study. BMC Public Health*; 2014; 14(1):1-11.

24. Duchaine CS, Aubé K, Gilbert-Ouimet M, *et al*. *Psychosocial Stressors at Work and the Risk of Sickness Absence Due to a Diagnosed Mental Disorder: A Systematic Review and Meta-analysis*. *JAMA Psychiatry*; 2020; 77(8):842-851.

25. Li TM, Pien LC, Kao CC, Kubo T, Cheng WJ. *Effects of work conditions and organisational strategies on nurses' mental health during the COVID-19 pandemic*. *J Nurs Manag*; 2022; 30(1):71.

26. Leineweber C, Marklund S, Gustafsson K, Helgesson M. *Work environment risk factors for the duration of all cause and diagnose-specific sickness absence among healthcare workers in Sweden: a prospective study. Occup Environ Med*; 2020; 77(11):782-789.

27. Marmot M, Friel S, Bell R, Houweling TA, Taylor S. *Closing the gap in a generation: health equity through action on the social determinants of health*. *The Lancet*; 2008; 372(9650):1661-1669.

28. Borrell i Thió C BJ. *Les Desigualtats En La Salut a Catalunya : Informe CAPS-Fundació Jaume Bofill.* . *Mediterrània*; 2005.

29. Llop-Gironés A, Vračar A, Llop-Gironés G, *et al. Employment and working conditions of nurses: where and how health inequalities have increased during the COVID-19 pandemic? Hum Resour Health*; 2021; 19(1):1-11.

30. Kluge H, Azzopardi-Muscat N. *The health workforce crisis in Europe is also a gender equality crisis. BMJ*; 2023; 380:p554.

31. Campos-Serna J, Ronda-Pérez E, Artazcoz L, Benavides FG. *Desigualdades de género en salud laboral en España. Gac Sanit*; 2012; 26(4):343-351.

32. Kivimäki M, Head J, Ferrie JE, Shipley MJ, Vahtera J, Marmot MG. *Sickness absence as a global measure of health: evidence from mortality in the Whitehall II prospective cohort study. BMJ*; 2003; 327(7411):364-368.

33. Wikman A, Marklund S, Alexanderson K. *Illness, disease, and sickness absence: an empirical test of differences between concepts of ill health. J Epidemiol Community Health (1978)*; 2005; 59(6):450-454.

34. North F, Syme SL, Feeney A, Head J, Shipley MJ, Marmot MG. *Explaining socioeconomic differences in sickness absence: the Whitehall II Study*. *BMJ;* 1993; 306(6874):361.

35. Giménez Lozano JM, Martínez Ramón JP, Morales Rodríguez FM. *Doctors and Nurses: A Systematic Review of the Risk and Protective Factors in Workplace Violence and Burnout. Int J Environ Res Public Health*; 2021; 18(6):1-19.

36. Izdebski Z, Kozakiewicz A, Białorudzki M, Dec-Pietrowska J, Mazur J. *Occupational Burnout in Healthcare Workers, Stress and Other Symptoms of Work Overload during the COVID-19 Pandemic in Poland*. *Int J Environ Res Public Health*; 2023; 20(3).

37. Lasalvia A, Amaddeo F, Porru S, *et al*. *Levels of burn-out among healthcare workers during the COVID-19 pandemic and their associated factors: a cross-sectional study in a tertiary hospital of a highly burdened area of north-east Italy. BMJ Open*; 2021; 11(1):e045127.

38. López-Atanes M, Pijoán-Zubizarreta JI, González-Briceño JP, *et al*. *Gender-Based Analysis of the Psychological Impact of the COVID-19 Pandemic on Healthcare Workers in Spain. Front Psychiatry*; 2021; 12:692215.

39. Heinonen N, Lallukka T, Lahti J, *et al*. *Working Conditions and Long-Term Sickness Absence Due to Mental Disorders: A Prospective Record Linkage Cohort Study Among 19- to 39-Year-Old Municipal Employees*. *J Occup Environ Med*; 2022; 64(2):105.

40. Edge R, Van Der Plaat DiA, Parsons V, *et al*. *Changing patterns of sickness absence among healthcare workers in England during the COVID-19 pandemic. J Public Health;* 2022; 44(1):e42-e50.

41. Insituto nacional de la Seguridad Social: Estadísticas ejercicio 2022. Accesible at: https://www.seg-social.es/wps/portal/wss/internet/EstadisticasPresupuestosEstudios/Estadisticas/EST45/EST46/46f9f9ea-3122-40af-a1ea-1575083f3e80

Tables and Figures

Sociodemographic and work variables		Sex: Female										Sex: Male										Sex: All	
		2018		2019		2020		2021		2022		2018		2019		2020		2021		2022		5-year period	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Occupational Category	Doctor	453	12.8	458	12.6	471	11.6	489	12	486	12	351	28.1	352	27.7	367	24.8	362	24.3	365	24	1,111	13,6
	Nurse aide	1,240	34.9	1,270	35	1,327	32.6	1,367	33.6	1,338	33.2	201	16.1	199	15.7	215	14.6	223	15	233	15.3	2,205	27,0
	Auxiliary nurse	928	26.1	968	26.7	1,081	26.6	1,056	26	1,074	26.6	169	13.5	178	14	209	14.2	198	13.3	217	14.3	1,918	23,5
	Resident/Trainee	208	5.9	207	5.7	350	8.6	275	6.8	282	7	114	9.1	114	9	139	9.4	126	8.5	129	8.5	843	10,3
	Orderly	247	7	256	7.1	276	6.8	279	6.9	283	7	208	16.6	218	17.2	240	16.2	259	17.4	267	17.6	781	9,6
	Administration	476	13.4	469	12.9	561	13.8	601	14.8	572	14.2	208	16.6	209	16.5	307	20.8	320	21.5	308	20.3	1,315	16,1
Facility	H. Mar	2,257	63.6	2,318	63.9	2,673	65.8	2,742	67.5	2,689	66.7	879	70.3	876	69	1,073	72.7	1,095	73.6	1,071	70.6	5,533	67,8
	H. Esperança	365	10.3	364	10	401	9.9	350	8.6	402	10	103	8.2	109	8.6	112	7.6	101	6.8	131	8.6	750	9,2
	FÓRUM	299	8.4	313	8.6	342	8.4	309	7.6	314	7.8	67	5.4	74	5.8	76	5.1	64	4.3	68	4.5	581	7,1
	CAEMIL	414	11.7	406	11.2	417	10.3	407	10	400	9.9	135	10.8	140	11	148	10	140	9.4	153	10.1	854	10,5
	Other	212	6	224	6.2	230	5.7	255	6.3	224	5.6	67	5.4	70	5.5	67	4.5	87	5.9	94	6.2	445	5,5
Shift	Day	2,824	79.5	2,964	81.7	3,134	77.1	3,205	78.8	3,244	80.4	1,007	80.5	1,050	82.7	1,144	77.5	1,227	82.5	1,246	82	6,350	77,7
	Night	556	15.7	602	16.6	733	18	716	17.6	695	17.2	157	12.5	179	14.1	240	16.2	204	13.7	220	14.5	1,373	16,8
	Other	172	4.8	62	1.7	199	4.9	146	3.6	96	2.4	87	7	41	3.2	93	6.3	57	3.8	53	3.5	450	5,5
Age	18-29	918	25.8	1,007	27.8	1,298	31.9	1,259	31	1,276	31.6	345	27.6	361	28.4	520	35.2	513	34.5	534	35.2	3,535	43,3
	30-49	1,610	45.3	1,621	44.7	1,739	42.8	1,781	43.8	1,750	43.4	578	46.2	581	45.7	627	42.5	629	42.3	639	42.1	3,152	38,6
	50-70	1,024	28.8	1,000	27.6	1,028	25.3	1,025	25.2	1,007	25	328	26.2	328	25.8	329	22.3	346	23.3	346	22.8	1,484	18,2
Medical department	Other departments	3,094	87.1	3,172	87.5	3,554	87.4	3,550	87.3	3,510	87	1,072	85.7	1,088	85.7	1,264	85.6	1,263	84.9	1,279	84.2	7,160	87,6
	Critical care and Emergency room	457	12.9	455	12.5	511	12.6	516	12.7	524	13	179	14.3	182	14.3	213	14.4	225	15.1	240	15.8	1,012	12,4
Total unique workers		3,552		3,628		4,066		4,067		4,035		1,251		1,270		1,477		1,488		1,519		8,173	

Table 1: Descriptive analysis of the total population by occupational and sociodemographic variables, segregated by sex (women, men, all) and year (2018-2022). Membership to each group is expressed as total number (n) and percentage (%)

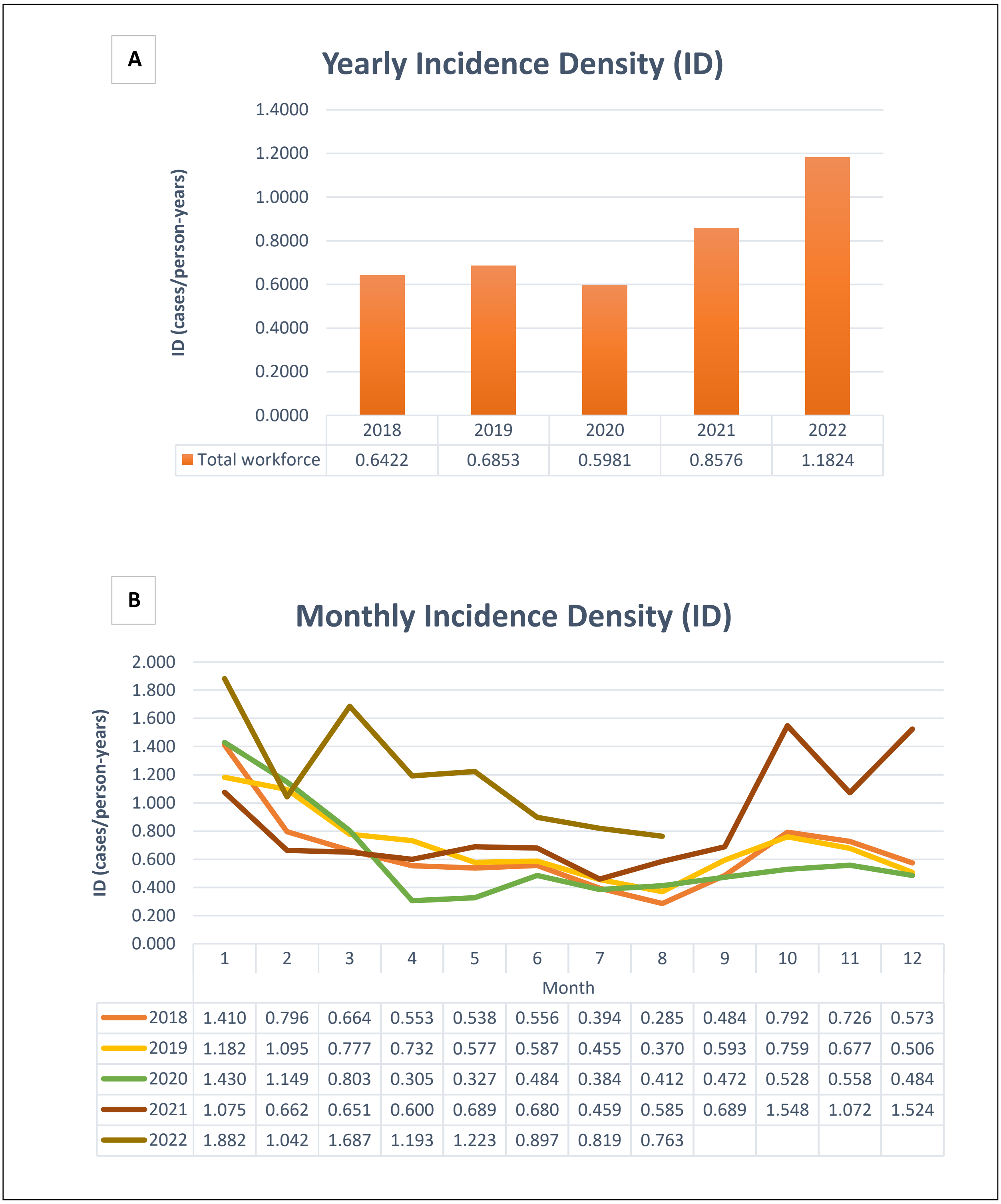

Figure 1: (A) Yearly incidence density calculated for the total workforce. *Incidence density calculated as total new sickness absence spells/total observation period (years)*. (B) Monthly incidence density calculated for the total workforce from January 2018 to August 2022. *Incidence density calculated as total new sickness absence spells/total observation period (years).*

	Incidence Density Rate (cases/person-years)									
	2018		2019		2020		2021		2022	
Month	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**
1	1,568	0,966	1,256	0,974	1,515	1,191	1,168	0,812	2,068	1,378
2	0,897	0,509	1,227	0,733	1,247	0,882	0,695	0,573	1,108	0,864
3	0,707	0,540	0,854	0,566	0,947	0,416	0,627	0,719	1,845	1,259
4	0,609	0,395	0,745	0,699	0,354	0,182	0,637	0,495	1,333	0,814
5	0,593	0,381	0,595	0,526	0,310	0,371	0,707	0,638	1,297	1,020
6	0,562	0,539	0,602	0,546	0,553	0,295	0,707	0,603	0,965	0,714
7	0,462	0,203	0,502	0,325	0,533	0,354	0,526	0,269	0,839	0,764
8	0,282	0,296	0,410	0,258	0,456	0,290	0,613	0,505	0,804	0,652
9	0,513	0,404	0,651	0,434	0,533	0,304	0,776	0,447		
10	0,890	0,523	0,864	0,463	0,593	0,352	1,645	1,282		
11	0,817	0,472	0,687	0,646	0,619	0,389	1,180	0,772		
12	0,622	0,439	0,557	0,364	0,542	0,324	1,674	1,105		
Yearly total	**0,704**	**0,470**	**0,738**	**0,538**	**0,670**	**0,435**	**0,918**	**0,689**	**1,276**	**0,930**

Table 2: Monthly incidence density rates segregated by sex and year. *Incidence density calculated as total new sickness absence spells/total observation period (years).*

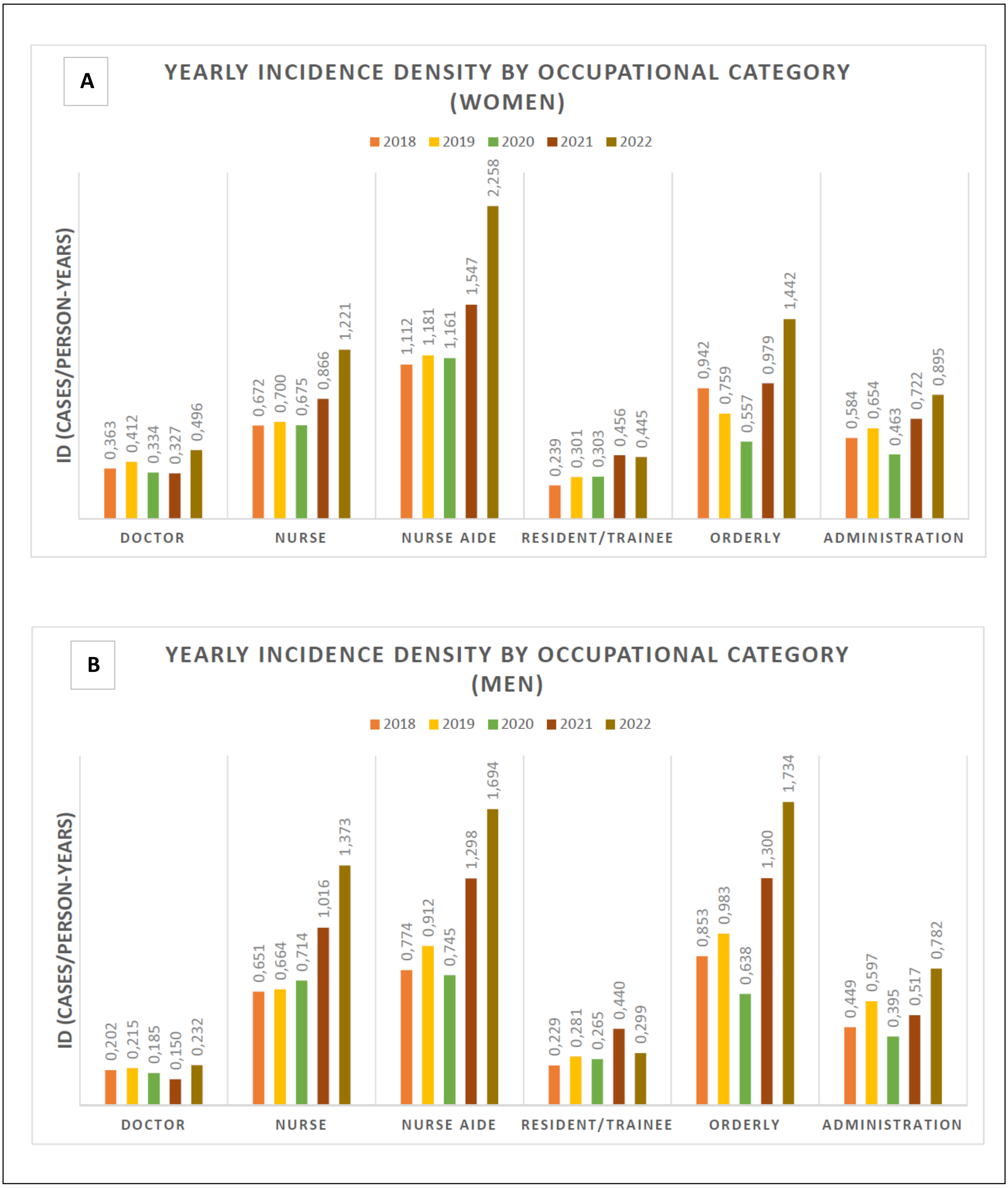

Figure 2: Yearly incidence rates calculated for every occupational category, segregated by sex: female (A) and male (B). *Incidence density calculated as total new sickness absence spells/total observation period (years).*

Figure 3: (A) Yearly incidence density rates calculated for different medical departments, segregated by sex. *Incidence density calculated as total new sickness absence spells/total observation period (years).* (B) Average length of sickness absence for female workers in each occupational category for every year. (C) Average length of sickness absence for male workers in each occupational category for every year.

		Sex: Female																			
		Model 0					Model 1					Model 2					Model 3				
		2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Predictive variables		OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)
Occupational Category *(Ref: Doctors)*	Nurse	2.055 (1.579/ 2.676)	1.736 (1.342/ 2.241)	2.041 (1.570/ 2.653)	2.952 (2.271/ 3.836)	2.744 (2.127/ 3.541)	2.118 (1.621/ 2.767)	1.712 (1.324/ 2.214)	2.072 (1.590/ 2.699)	2.895 (2.225/ 3.766)	2.733 (2.115/ 3.533)	1,874 (1,426/ 2,462)	1,579 (1,213/ 2,055)	1,96 (1,494/ 2,570)	2,597 (1,983/ 3,402)	2,355 (1,811/ 3,063)	1,866 (1,420/ 2,452)	1,551 (1,191/ 2,021)	1,924 (1,465/ 2,526)	2,479 (1,891/ 3,250)	2,301 (1,768/ 2,995)
	Nurse aide	3.172 (2.422/ 4.155)	2.692 (2.075/ 3.491)	3.174 (2.434/ 4.140)	6.035 (4.615/ 7.892)	4.726 (3.644/ 6.130)	3.04 (2.303/ 4.012)	2.418 (1.854/ 3.154)	3.245 (2.473/ 4.259)	5.87 (4.471/ 7.708)	4.724 (3.623/ 6.158)	2,628 (1,977/ 3,492)	2,219 (1,690/ 2,914)	3,069 (2,322/ 4,057)	5,17 (3,913/ 6,830)	4,065 (3,099/ 5,331)	2,618 (1,970/ 3,480)	2,199 (1,674/ 2,889)	3,033 (2,294/ 4,011)	5,038 (3,812/ 6,658)	4,025 (3,068/ 5,280)
	Resident/ Trainee	1.346 (0.849/ 2.134)	1.072 (0.692/ 1.661)	0.95 (0.631/ 1.429)	1.975 (1.356/ 2.878)	0.857 (0.568/ 1.293)	1.382 (0.869/ 2.198)	1.036 (0.667/ 1.609)	0.951 (0.631/ 1.435)	1.922 (1.318/ 2.803)	0.866 (0.573/ 1.308)	1,278 (0,802/ 2,037)	0,962 (0,619/ 1,495)	0,889 (0,587/ 1,346)	1,745 (1,195/ 2,550)	0,792 (0,523/ 1,198)	1,276 (0,800/ 2,036)	0,978 (0,628/ 1,521)	0,884 (0,584/ 1,338)	1,732 (1,185/ 2,533)	0,804 (0,531/ 1,218)
	Orderly	2.701 (1.901/ 3.838)	1.756 (1.241/ 2.484)	1.345 (0.931/ 1.943)	2.812 (2.000/ 3.954)	2.341 (1.674/ 3.272)	2.837 (1.985/ 4.054)	1.783 (1.255/ 2.535)	1.409 (0.971/ 2.043)	2.821 (2.000/ 3.979)	2.308 (1.645/ 3.239)	2,666 (1,862/ 3,816)	1,657 (1,164/ 2,359)	1,292 (0,889/ 1,878)	2,528 (1,789/ 3,571)	2,1 (1,494/ 2,953)	2,66 (1,857/ 3,811)	1,669 (1,171/ 2,377)	1,291 (0,888/ 1,876)	2,577 (1,823/ 3,642)	2,131 (1,515/ 2,998)
	Administration	1.39 (1.019/ 1.879)	1.505 (1.117/ 2.028)	1.166 (0.855/ 1.589)	2.056 (1.532/ 2.761)	1.727 (1.291/ 2.309)	1.401 (1.024/ 1.916)	1.537 (1.139/ 2.074)	1.173 (0.859/ 1.601)	2.074 (1.542/ 2.788)	1.743 (1.301/ 2.337)	1,317 (0,961/ 1,804)	1,421 (1,051/ 1,922)	1,103 (0,806/ 1,508)	1,846 (1,371/ 2,487)	1,57 (1,169/ 2,108)	1,313 (0,958/ 1,800)	1,418 (1,049/ 1,919)	1,096 (0,801/ 1,499)	1,836 (1,363/ 2,474)	1,573 (1,171/ 2,113)
Age *(Ref: 18-29)*	30-49	1.974 (1.613/ 2.416)	1.574 (1.306/ 1.897)	1.604 (1.339/ 1.921)	1.287 (1.094/ 1.515)	1.178 (1.001/ 1.387)	1.983 (1.618/ 2.431)	1.581 (1.311/ 1.907)	1.601 (1.337/ 1.918)	1.296 (1.101/ 1.527)	1.179 (1.001/ 1.388)	1,957 (1,596/ 2,400)	1,574 (1,304/ 1,898)	1,592 (1,328/ 1,909)	1,301 (1,104/ 1,533)	1,176 (0,998/ 1,386)	1,957 (1,595/ 2,400)	1,581 (1,310/ 1,908)	1,595 (1,330/ 1,912)	1,308 (1,110/ 1,543)	1,189 (1,009/ 1,402)
	50-70	2.531 (2.041/ 3.139)	1.67 (1.364/ 2.044)	1.987 (1.633/ 2.418)	1.236 (1.030/ 1.483)	1.284 (1.071/ 1.539)	2.548 (2.052/ 3.165)	1.655 (1.350/ 2.028)	1.987 (1.632/ 2.420)	1.243 (1.034/ 1.494)	1.286 (1.071/ 1.544)	2,542 (2,045/ 3,160)	1,662 (1,356/ 2,038)	2,16 (1,768/ 2,639)	1,374 (1,139/ 1,656)	1,323 (1,101/ 1,591)	2,546 (2,048/ 3,167)	1,687 (1,375/ 2,069)	2,179 (1,783/ 2,663)	1,412 (1,170/ 1,704)	1,355 (1,126/ 1,630)
Facility *(Ref: Hospital del Mar)*	H. Esperança						0.802 (0.621/ 1.039)	0.801 (0.622/ 1.033)	0.818 (0.639/ 1.049)	0.892 (0.701/ 1.134)	1.091 (0.872/ 1.364)	0,807 (0,624/ 1,043)	0,805 (0,624/ 1,039)	0,84 (0,653/ 1,079)	0,911 (0,715/ 1,162)	1,105 (0,883/ 1,383)	0,809 (0,623/ 1,049)	0,836 (0,645/ 1,082)	0,862 (0,669/ 1,111)	0,99 (0,774/ 1,265)	1,159 (0,923/ 1,455)
	FÓRUM						1.082 (0.831/ 1.409)	1.265 (0.983/ 1.627)	0.911 (0.706/ 1.176)	1.065 (0.830/ 1.366)	1.052 (0.820/ 1.351)	1,114 (0,854/ 1,453)	1,262 (0,981/ 1,624)	0,908 (0,701/ 1,175)	1,058 (0,823/ 1,362)	1,065 (0,829/ 1,369)	1,117 (0,853/ 1,463)	1,311 (1,015/ 1,694)	0,933 (0,719/ 1,213)	1,156 (0,896/ 1,491)	1,119 (0,868/ 1,443)
	CAEMIL						1.426 (1.132/ 1.796)	1.523 (1.214/ 1.911)	0.987 (0.782/ 1.247)	1.013 (0.809/ 1.267)	0.957 (0.762/ 1.202)	1,45 (1,149/ 1,830)	1,503 (1,198/ 1,885)	0,913 (0,722/ 1,155)	0,953 (0,761/ 1,195)	0,927 (0,738/ 1,166)	1,453 (1,148/ 1,840)	1,559 (1,238/ 1,964)	0,937 (0,739/ 1,189)	1,036 (0,825/ 1,302)	0,971 (0,770/ 1,224)
	Other						1.19 (0.866/ 1.636)	0.84 (0.611/ 1.153)	1.003 (0.729/ 1.379)	0.831 (0.616/ 1.121)	0.92 (0.673/ 1.256)	1,231 (0,895/ 1,694)	0,851 (0,619/ 1,170)	0,962 (0,698/ 1,326)	0,831 (0,616/ 1,122)	0,969 (0,709/ 1,325)	1,233 (0,894/ 1,699)	0,878 (0,637/ 1,210)	0,982 (0,711/ 1,355)	0,888 (0,657/ 1,201)	1,006 (0,735/ 1,377)
Shift *(Ref: Day)*	Night											1,379 (1,127/ 1,686)	1,074 (0,884/ 1,306)	1,076 (0,895/ 1,292)	1,258 (1,055/ 1,501)	1,369 (1,147/ 1,634)	1,376 (1,124/ 1,685)	1,054 (0,866/ 1,282)	1,061 (0,882/ 1,276)	1,207 (1,011/ 1,442)	1,335 (1,117/ 1,596)
	Other											0,433 (0,281/ 0,668)	0,232 (0,092/ 0,587)	0,137 (0,075/ 0,248)	0,138 (0,074/ 0,260)	0,2 (0,099/ 0,404)	0,431 (0,279/ 0,667)	0,212 (0,083/ 0,539)	0,134 (0,074/ 0,243)	0,126 (0,067/ 0,237)	0,186 (0,092/ 0,376)
Medical department *(Ref: Other)*	Critical care and Emergency room																1,016 (0,801/ 1,289)	1,231 (0,979/ 1,549)	1,163 (0,929/ 1,456)	1,647 (1,335/ 2,030)	1,312 (1,064/ 1,617)
Goodness of fit	***P-value / Hosmer-Lemeshow***																<0,001/ 0,107	<0,001/ 0,233	<0,001/ 0,504	<0,001/ 0,054	<0,001/ 0,682

Table 3: Logistic regression model for female workers. Data has been divided by year and the variables have been added progressively (model 0: occupational category and age, model 1: previous and facility, model 2: previous and shift, and model 3: previous and medical department). Indicates *P-value* < 0.05. *Goodness of fit*: *P-value* (statistical significance described at *P-value* < 0.05) and Hosmer-Lemeshow (goodness of fit at > 0.05).

		Sex: Male																			
		Model 0					Model 1					Model 2					Model 3				
		2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Predictive variables		OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)	OR (CI95%)
Occupational Category *(Ref: Doctors)*	Nurse	3,019 (1,921/ 4,742)	2,675 (1,709/ 4,187)	3,081 (1,971/ 4,816)	5,161 (3,304/ 8,063)	6,507 (4,195/ 10,094)	2,847 (1,791/ 4,524)	2,55 (1,613/ 4,032)	2,914 (1,844/ 4,607)	4,805 (3,057/ 7,552)	6,663 (4,267/ 10,404)	2,825 (1,735/ 4,600)	2,568 (1,578/ 4,179)	3,119 (1,932/ 5,036)	4,158 (2,587/ 6,683)	5,853 (3,680/ 9,311)	2,815 (1,725/ 4,595)	2,493 (1,525/ 4,077)	2,994 (1,845/ 4,858)	3,818 (2,362/ 6,173)	5,562 (3,488/ 8,868)
	Nurse aide	3,437 (2,142/ 5,516)	3,82 (2,426/ 6,015)	2,904 (1,823/ 4,625)	7,62 (4,836/ 12,005)	7,229 (4,623/ 11,306)	3,098 (1,852/ 5,181)	3,402 (2,083/ 5,555)	2,582 (1,567/ 4,255)	6,483 (4,016/ 10,465)	7,634 (4,763/ 12,236)	3,141 (1,838/ 5,368)	3,431 (2,047/ 5,751)	2,739 (1,633/ 4,596)	5,599 (3,409/ 9,196)	6,645 (4,075/ 10,836)	3,134 (1,832/ 5,360)	3,363 (2,003/ 5,647)	2,662 (1,584/ 4,475)	5,176 (3,138/ 8,537)	6,304 (3,858/ 10,299)
	Resident/ Trainee	1,796 (0,923/ 3,496)	1,9 (1,031/ 3,501)	1,628 (0,868/ 3,054)	2,753 (1,542/ 4,915)	1,492 (0,774/ 2,876)	1,73 (0,887/ 3,377)	1,939 (1,049/ 3,586)	1,613 (0,857/ 3,035)	2,633 (1,473/ 4,707)	1,486 (0,770/ 2,868)	1,586 (0,808/ 3,113)	1,969 (1,055/ 3,675)	1,52 (0,804/ 2,872)	2,432 (1,355/ 4,365)	1,388 (0,717/ 2,687)	1,593 (0,809/ 3,136)	2,019 (1,079/ 3,778)	1,549 (0,818/ 2,931)	2,504 (1,391/ 4,507)	1,439 (0,742/ 2,792)
	Orderly	3,53 (2,265/ 5,500)	4,13 (2,703/ 6,309)	3,176 (2,040/ 4,944)	6,09 (3,947/ 9,396)	6,647 (4,322/ 10,223)	3,556 (2,272/ 5,564)	4,265 (2,776/ 6,554)	3,077 (1,967/ 4,813)	5,887 (3,806/ 9,106)	6,684 (4,338/ 10,300)	3,449 (2,179/ 5,459)	4,312 (2,763/ 6,730)	3,058 (1,942/ 4,815)	5,304 (3,405/ 8,263)	6,008 (3,874/ 9,316)	3,442 (2,173/ 5,453)	4,238 (2,710/ 6,627)	2,99 (1,895/ 4,179)	5,063 (3,240/ 7,912)	5,813 (3,743/ 9,029)
	Administration	1,646 (1,020/ 2,655)	2,624 (1,696/ 4,061)	1,606 (1,024/ 2,520)	2,763 (1,787/ 4,272)	3,012 (1,952/ 4,647)	1,633 (1,010/ 2,640)	2,452 (1,577/ 3,812)	1,559 (0,991/ 2,451)	2,763 (1,781/ 4,287)	3,15 (2,033/ 4,881)	1,55 (0,955/ 2,515)	2,484 (1,580/ 3,906)	1,584 (1,004/ 2,499)	2,557 (1,641/ 3,983)	2,915 (1,847/ 4,533)	1,551 (0,956/ 2,518)	2,48 (1,576/ 3,901)	1,599 (1,013/ 2,524)	2,512 (1,609/ 3,923)	2,916 (1,873/ 4,540)
Age *(Ref: 18-29)*	30-49	1,775 (1,229/ 2,564)	1,5 (1,083/ 2,078)	1,211 (0,877/ 1,672)	1,12 (0,850/ 1,478)	1,293 (0,983/ 1,701)	1,749 (1,208/ 2,533)	1,448 (1,042/ 2,013)	1,166 (0,840/ 1,617)	1,119 (0,846/ 1,481)	1,341 (1,017/ 1,769)	0,864 (0,569/ 1,312)	1,447 (1,041/ 2,012)	1,132 (0,815/ 1,571)	1,117 (0,844/ 1,478)	1,348 (1,022/ 1,779)	1,718 (1,183/ 2,493)	1,459 (1,049/ 2,029)	1,136 (0,818/ 1,578)	1,129 (0,852/ 1,495)	1,359 (1,029/ 1,795)
	50-70	2,4 (1,568/ 3,672)	1,232 (0,828/ 1,832)	2,035 (1,387/ 2,986)	1,208 (0,853/ 1,711)	1,301 (0,922/ 1,835)	2,353 (1,531/ 3,615)	1,19 (0,797/ 1,778)	1,901 (1,289/ 2,805)	1,151 (0,807/ 1,641)	1,337 (0,944/ 1,894)	0,864 (0,569/ 1,312)	1,193 (0,797/ 1,783)	1,866 (1,262/ 2,758)	1,16 (0,812/ 1,658)	1,325 (0,934/ 1,879)	2,258 (1,457/ 3,498)	1,212 (0,809/ 1,816)	1,901 (1,284/ 2,815)	1,204 (0,841/ 1,724)	1,376 (0,968/ 1,957)
Facility *(Ref: Hospital del Mar)*	H. Esperança						0,802 (0,470/ 1,369)	0,931 (0,576/ 1,506)	1,421 (0,892/ 2,264)	1,135 (0,712/ 1,808)	0,973 (0,629/ 1,507)	0,776 (0,455/ 1,325)	0,935 (0,577/ 1,514)	1,383 (0,867/ 2,204)	1,143 (0,718/ 1,821)	0,977 (0,631/ 1,511)	0,781 (0,454/ 1,342)	0,972 (0,596/ 1,586)	1,458 (0,907/ 2,343)	1,274 (0,796/ 2,041)	1,08 (0,694/ 1,681)
	FÓRUM						1,289 (0,722/ 2,302)	1,596 (0,941/ 2,706)	1,139 (0,640/ 2,029)	1,164 (0,663/ 2,046)	1,098 (0,639/ 1,888)	1,219 (0,680/ 2,186)	1,6 (0,943/ 2,715)	1,09 (0,611/ 1,947)	1,207 (0,685/ 2,126)	1,111 (0,644/ 1,916)	1,227 (0,679/ 2,217)	1,675 (0,978/ 2,868)	1,162 (0,645/ 2,093)	1,384 (0,780/ 2,455)	1,245 (0,718/ 2,160)
	CAEMIL						1,162 (0,738/ 1,828)	1,252 (0,816/ 1,921)	1,456 (0,948/ 2,236)	1,496 (1,004/ 2,229)	0,758 (0,505/ 1,135)	1,187 (0,754/ 1,870)	1,255 (0,818/ 1,927)	1,406 (0,915/ 2,162)	1,509 (1,012/ 2,252)	0,761 (0,507/ 1,143)	1,193 (0,753/ 1,890)	1,299 (0,841/ 2,007)	1,484 (0,958/ 2,299)	1,684 (1,122/ 2,527)	0,845 (0,559/ 1,277)
	Other						0,836 (0,421/ 1,660)	1,874 (1,091/ 3,221)	1,593 (0,874/ 2,905)	0,743 (0,413/ 1,333)	0,66 (0,378/ 1,154)	0,792 (0,398/ 1,575)	1,888 (1,095/ 3,255)	1,459 (0,797/ 2,670)	0,739 (0,412/ 1,328)	0,669 (0,382/ 1,170)	0,796 (0,399/ 1,588)	1,949 (1,125/ 3,376)	1,52 (0,828/ 2,793)	0,81 (0,450/ 1,459)	0,725 (0,413/ 1,273)
Shift *(Ref: Day)*	Night											0,864 (0,569/ 1,312)	1,015 (0,694/ 1,485)	0,75 (0,515/ 1,093)	1,282 (0,916/ 1,793)	1,279 (0,923/ 1,771)	0,863 (0,568/ 1,311)	1,013 (0,692/ 1,482)	0,741 (0,508/ 1,079)	1,237 (0,884/ 1,731)	1,217 (0,877/ 1,689)
	Other											0,864 (0,569/ 1,312)	1,138 (0,476/ 2,722)	0,453 (0,212/ 0,966)	0,41 (0,156/ 1,075)	0,393 (0,149/ 1,037)	0,402 (0,187/ 0,865)	1,011 (0,408/ 2,510)	0,428 (0,200/ 0,917)	0,349 (0,133/ 0,915)	0,329 (0,124/ 0,874)
Medical department *(Ref: Other)*	Critical care and Emergency room																1,031 (0,673/ 1,579)	1,204 (0,807/ 1,796)	1,288 (0,866/ 1,916)	1,632 (1,165/ 2,287)	1,547 (1,108/ 2,160)
Goodness of fit	***P-value / Hosmer-Lemeshow***																<0,001/ 0,675	<0,001/ 0,331	<0,001/ 0,494	<0,001/ 0,421	<0,001/ 0,548

Table 4: Logistic regression model for male workers. Data has been divided by year and the variables have been added progressively (model 0: occupational category and age, model 1: *previous* and facility, model 2: *previous* and shift, and model 3: *previous* and medical department). ▇ Indicates *P-value* < 0.05. *Goodness of fit*: *P-value* (statistical significance described at *P-value* < 0.05) and Hosmer-Lemeshow (goodness of fit at > 0.05).

Supplementary materials

		2018				2019				2020				2021				2022			
		Female		Male		Female		Male		Female		Male		Female		Male		Female		Male	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Occupational Category	Doctor	453	**56,3**	351	**43,7**	458	**56,5**	352	**43,5**	471	**56,2**	367	**43,8**	489	**57,5**	362	**42,5**	486	**57,1**	365	**42,9**
	Nurse aide	1240	**86,1**	201	**13,9**	1270	**86,5**	199	**13,5**	1327	**86,1**	215	**13,9**	1367	**86**	223	**14**	1338	**85,2**	233	**14,8**
	Auxiliary nurse	928	**84,6**	169	**15,4**	968	**84,5**	178	**15,5**	1081	**83,8**	209	**16,2**	1056	**84,2**	198	**15,8**	1074	**83,2**	217	**16,8**
	Resident/Trainee	208	**64,6**	114	**35,4**	207	**64,5**	114	**35,5**	350	**71,6**	139	**28,4**	275	**68,6**	126	**31,4**	282	**68,6**	129	**31,4**
	Orderly	247	**54,3**	208	**45,7**	256	**54**	218	**46**	276	**53,5**	240	**46,5**	279	**51,9**	259	**48,1**	283	**51,5**	267	**48,5**
	Administration	476	**69,6**	208	**30,4**	469	**69,2**	209	**30,8**	561	**64,6**	307	**35,4**	601	**65,3**	320	**34,7**	572	**65**	308	**35**

Supplementary Table 1: Percentage (%) and total number (n) of females and males in each occupational category, segregated by year.