



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Enfermedades Infecciosas y Microbiología Clínica

www.elsevier.es/eimc



Original article

Effectiveness of the BNT162b2 mRNA Covid-19 vaccine in Spanish healthcare workers

Concepción Núñez López^a, Juan Manuel González de Abreu^a, Verónica Pérez-Blanco^b, Rosa de Miguel Buckley^c, María Pilar Romero Gómez^d, Marta Díaz-Menéndez^{c,*}, on behalf of La Paz Health Care Workers Vaccination Study Group[◇]

^a Occupational Health Department, La Paz University Hospital, Madrid, Spain

^b Preventive Medicine Department, La Paz University Hospital, Madrid, Spain

^c Infectious Disease Unit, Internal Medicine Department, La Paz University Hospital, Madrid, Spain

^d Microbiology Department, La Paz University Hospital, Madrid, Spain

ARTICLE INFO

Article history:

Received 31 March 2021

Accepted 15 June 2021

Available online xxx

Keywords:

Healthcare workers

COVID

SARS-CoV2

Vaccine

ABSTRACT

Introduction: Frontline health care workers (HCW) have higher risk than the general population to become infected by SARS-CoV.2, so they were a priority group for Covid-19 vaccine administration. We compared the incidence and prevalence of HCW infected pre-and post-vaccination with the BNT162b2 mRNA COVID-19 vaccine.

Material and methods: Prospective observational study carried out between 01/12/20 and 07/03/21 in La Paz University Hospital, Madrid (Spain). SARS-CoV.2 positive cases in HCW after vaccination were collected and compared to those hospitalized COVID-19 patients at the same hospital.

Results: Two weeks after finishing the first round of vaccinations daily new cases of HCW infections (symptomatic and asymptomatic) decreased substantially and cumulative cases of infected HCW and hospitalized COVID-19 patients started to diverge. No new positive cases of HCW infection were registered seven days after the second dose of BNT162b2 mRNA COVID-19 vaccine.

Conclusions: BNT162b2 mRNA COVID-19 vaccine is highly effective in Spanish HCW.

© 2021 Sociedad Española de

Enfermedades Infecciosas y Microbiología Clínica. Published by Elsevier España, S.L.U. All rights reserved.

Impacto de la vacuna BNT162b2 de mRNA frente a COVID-19 en personal sanitario español

RESUMEN

Introducción: Los trabajadores sanitarios (TS) de primera línea tienen mayor riesgo de infectarse de SARS-CoV-2 que la población general, por lo que han sido un grupo prioritario para la vacunación frente a COVID-19. Comparamos la incidencia y prevalencia de TS infectados antes y después de la vacunación con BNT162b2 mRNA frente a COVID-19.

Material y métodos: Estudio prospectivo observacional realizado entre 01 de diciembre de 2021 en el Hospital Universitario La Paz, Madrid, España. Se registraron los casos positivos para SARS-CoV-2 en TS y se compararon con los hospitalizados por COVID-19.

Palabras clave:

Trabajadores sanitarios

COVID

SARS-CoV2

Vacuna

* Corresponding author.

E-mail address: marta.diaz@salud.madrid.org (M. Díaz-Menéndez).

◇ A list of the on behalf of La Paz Health Care Workers Vaccination Study Group 5 members (COVID@HULP Working Group) is provided in the [Appendix](#).

Resultados: Dos semanas tras la primera ronda de vacunación las nuevas infecciones en TS (sintomáticas y asintomáticos) disminuyeron sustancialmente y los casos acumulados de TS infectados y pacientes hospitalizados por COVID-19 empezaron a divergir. No hubo nuevas infecciones en TS vacunados a los siete días de la segunda dosis de la vacuna.

Conclusión: La vacuna BNT162b2 mRNA frente a SARS-CoV-2 es altamente eficaz en TS españoles.

© 2021 Sociedad Española de Enfermedades Infecciosas y Microbiología Clínica. Publicado por Elsevier España, S.L.U. Todos los derechos reservados.

Introduction

On December 21st, 2020, the European Commission authorized BioNTech and Pfizer’s BNT162b2 mRNA Covid-19 vaccine.¹ Spain began vaccinating on Sunday 27th December prioritizing two groups: (1) Residents and staff working in long-term care facilities for the elderly or the highly dependent and (2) frontline staff in the health and social-health care fields.²

Healthcare workers (HCW) are key in this pandemic to ensure the continuous care of the overwhelming numbers of COVID-19 patients. Consequently, frontline HCW have a 3.4-fold higher risk than the general population to become infected.³ Not only are HCW highly exposed to SARS-CoV-2 due to their professional activity but they are also in close contact with vulnerable patients at high risk of severe COVID-19, which is why this group has been considered a priority for COVID-19 vaccination.^{4,5} Mathematical models support the benefits of frontline HCW vaccination in the reduction of deaths, hospital and ICU admissions from COVID-19.⁶ However, little is yet known about the effectiveness of these strategies.⁷

Methods

La Paz University Hospital is a 1270-bed hospital with a catchment area of more than 500,000 individuals in the north of Madrid. During the pandemic, the hospital adapted its infrastructure in response to the high caseload, and by 12 February 2021, the hospital had attended 11,021 patients with COVID-19, one of the largest single-center cohorts in Europe.

Study design, period and participants: This is a prospective observational study carried out between 01/12/20 and 07/03/21. Our hospital has 7410 employees, which increased to 8329 in response to the high demand for care at the time of the epidemic.

Definitions: Confirmed case was defined as any healthcare worker with positive SARS-CoV-2 nucleic acid in a clinical specimen.

Epidemiological data collection: Data collection was daily carried out by the Occupational Health Department, in order to perform the clinical surveillance of employees. This Department was responsible also for the follow-up COVID-19 contact tracing and screenings, as well as HCW vaccination. Cumulative incidence of Madrid Region was obtained from Public Health weekly reports. Daily cases of total hospitalized COVID-19 patients were obtained from the Preventive Medicine Department records.

Results and discussion

We aimed to compare the incidence and prevalence of HCW infected pre-and post-vaccination with the BNT162b2 mRNA COVID-19 vaccine. The periods of vaccination were from 10/01/21 to 19/01/21 (first dose 7502 HCW) and from 01/02/21 to 09/02/21 (second dose 7423 HCW). For HCW who could not be vaccinated in this period of time (10,9%), a second round of vaccination started on a 17/02/21. Fig. 1 shows that the curves for the cumulative cases HCW and hospitalized COVID-19 patients paralleled during the so-called “second wave” of the pandemic in Madrid starting 31/08/20, that reached its peak on 31/1/21. Fig. 2 also shows that daily new cases of HCW infections in our hospital were in line with the 14 days

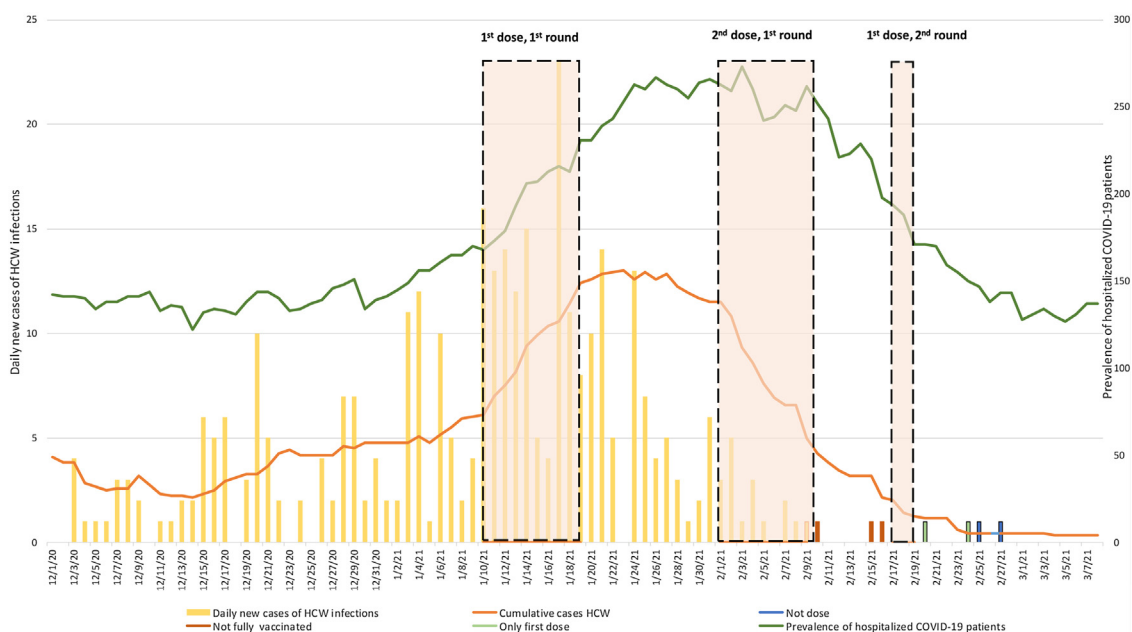


Fig. 1. Daily new cases of COVID19 hospitalized patients, and daily new cases of infected HCW COVID19 pre-and post-vaccination. Footnote: HCW: healthcare workers.

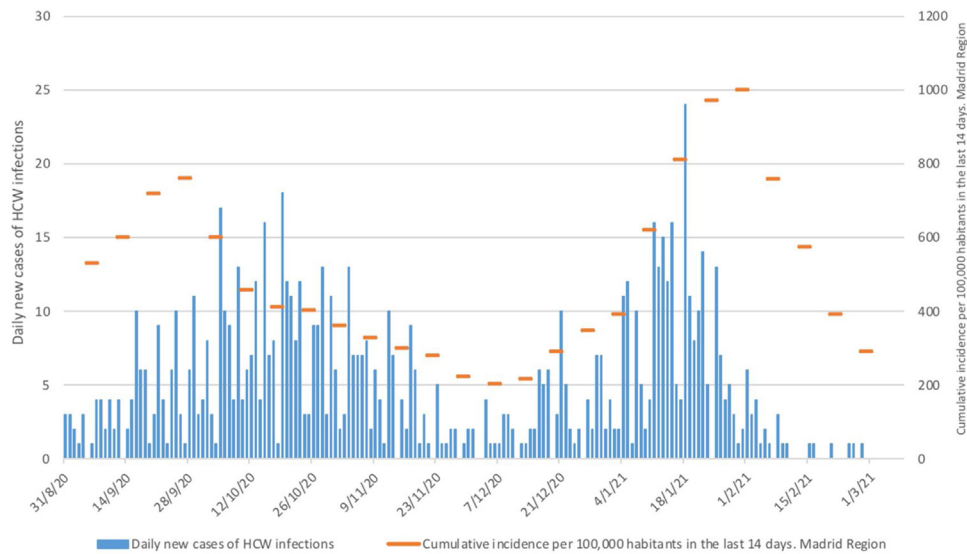


Fig. 2. Daily new cases of COVID19 in HCW and 14 days cumulative cases per 100,000 habitants in the Madrid region. Footnote: HCW: Healthcare workers.

cumulative incidence of COVID-19 cases per 100,000 habitants in the Madrid region in this time period.⁸

Since approximately two weeks after finishing the first round of vaccinations daily new cases of HCW infections (symptomatic and asymptomatic) decreased substantially and the cumulative cases of infected HCW and hospitalized COVID-19 patients started to diverge (Fig. 1). The curve of infected HCW decreased from a maximum of 157 on 23/10/20 to seven on 23/2/21. Daily incidence of new cases of infected HCW reached a maximum of 24 on 18/1/21 and decreased to zero after 16/2/21. This divergence between the prevalence curves is appreciable despite the fact that the 14 days cumulative incidence of COVID-19 cases is at present decreasing in Madrid. Of note, we have not seen any new case of HCW infection after seven days of the second dose of vaccination among the HCW (89% of the total) who have received the two doses of the BNT162b2 mRNA Covid-19 vaccine. Despite the presented data, the limitations of this type of observational study must be taken into account, including the potential for bias in the reporting of symptoms or positive tests.

To the best of our knowledge this is one of the first examples of the high effectiveness of a COVID vaccine in Spanish HCW. We can only hope to see, in the upcoming months, that this impressive benefit is also shared by the general population.

Conflict of interests

The authors declare that they have no conflict of interest.

Appendix. La Paz Health Care Workers Vaccination Study Group: Authors and affiliations

Occupational Health Department: Concepción Núñez López, Juan Manuel González, Natalia Arizaga Lobeto, Natalia Pérez Hidalgo, Maria Castiñeiras Ortega, Consuelo Rodrigo Garcia-Pando

Preventive Medicine Department: Verónica Pérez-Blanco, Claudia García-Vaz

Microbiology Department: Julio García Rodríguez, María Pilar Romero Gómez

Internal Medicine Department: Francisco Arnalich Fernández

Infectious Disease Unit: Rosa de Miguel Buckley, Marta Díaz-Menéndez, Jose R. Arribas.

References

1. European Medicine Agency. Comirnaty Vaccine: summary of product characteristics. Available from: https://www.ema.europa.eu/en/documents/product-information/comirnaty-epar-product-information_en.pdf [accessed 18.3.2021].
2. Grupo de Trabajo Técnico de Vacunación COVID-19 de la Ponencia de Programa y Registro de Vacunaciones. Estrategia de Vacunación frente a COVID-19 en España, Actualización 1. Consejo Interterritorial del SNS. Ministerio de Sanidad, 18 diciembre 2020. Available from: <https://www.msbs.gob.es/profesionales/saludPublica/prevPromocion/vacunaciones/covid19/docs/COVID19.Actualizacion1.EstrategiaVacunacion.pdf> [accessed 18.3.21].
3. Nguyen LH, Drew DA, Graham MS, Joshi AD, Guo CG, Ma W, et al. Risk of COVID-19 among front-line health-care workers and the general community: a prospective cohort study. *Lancet Public Health*. 2020;5:e475–83.
4. Dooling K, Marin M, Wallace M, McClung N, Chamberland M, Lee GM, et al. The advisory committee on immunization practices' updated interim recommendation for allocation of COVID-19 vaccine—United States, December 2020. *MMWR Morb Mortal Wkly Rep*. 2021;69:1657–60. <http://dx.doi.org/10.15585/mmwr.mm695152e2external.icon>.
5. Chou R, Dana T, Buckley DI, Selph S, Fu R, Totten AM. Epidemiology of and risk factors for coronavirus infection in health care workers: a living rapid review. *Ann Intern Med*. 2020;173:120–36. <http://dx.doi.org/10.7326/M20-1632>. Epub 2020 May 5. PMID: 32369541.
6. Cook TM, Roberts JV. Impact of vaccination by priority group on UK deaths, hospital admissions and intensive care admissions from COVID-19. *Anaesthesia*. 2021. <http://dx.doi.org/10.1111/anae.15442>. Epub ahead of print. PMID: 33572007.
7. Halley MC, Mangurian C. Caring for the caregivers – Covid-19 vaccination for essential members of the health care team. *N Engl J Med*. 2021;384:e33. <http://dx.doi.org/10.1056/NEJMp2101339>. Epub 2021 Feb 12. PMID: 33577149.
8. Consejería de Sanidad, Dirección General de Salud Pública. Informe Epidemiológico Semanal Comunidad de Madrid, semana 6, 2021. https://www.comunidad.madrid/sites/default/files/doc/sanidad/epid/informe_epidemiologico_semanal.pdf.