

**BIOSEGURIDAD  
PARA EL CUIDADO DE LA VIDA**

*San Andrés, Providencia  
y Santa catalina*

**DEPARTAMENTOS SEGUROS Y  
RESPONSABLES CON EL BIENESTAR**

**2DO FORO REGIONAL**

**“TODOS POR UN NUEVO COMIENZO”**



Pontificia Universidad  
**JAVERIANA**  
Cali



# Bioseguridad y la *Nueva normalidad*

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## EL MITO

*“El coronavirus es un virus nuevo y mutante, creado en un laboratorio”*



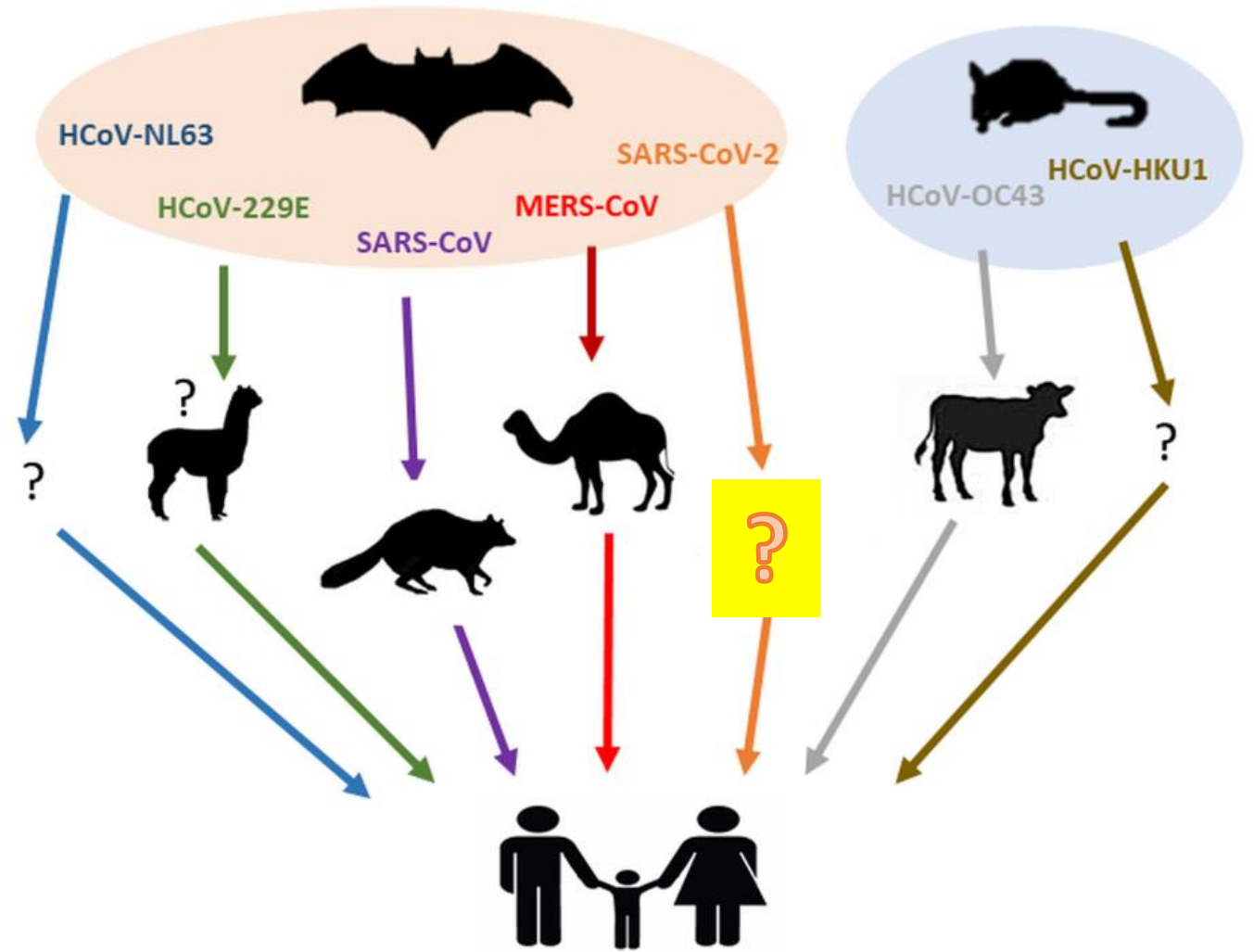


June Almeida



**CORONAVIRUS**

# CORONAVIRUS





EL MITO

“Los hospitales son la fuente  
más importante de contagio”

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**CORONAVIRUS**



A large, multi-eyed octopus with reddish-brown tentacles and numerous suckers is attacking a white-sailed ship on a blue sea. The octopus is emerging from the water, with its tentacles reaching towards the ship. The sky is a mix of purple and blue, suggesting a sunset or sunrise. The overall scene is dramatic and fantastical.

## EL MITO

*“En los pacientes del hospital está el mayor riesgo de contagio”*

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A photograph of two healthcare workers in a clinical setting, fully equipped with personal protective equipment (PPE). They are wearing blue gowns, white gloves, white shoes, and yellow hard hats with clear face shields. The worker on the left is also wearing a white surgical mask, while the worker on the right is wearing a blue surgical mask. They are standing in a room with white walls and a wooden floor. In the background, there are medical carts and equipment. On the right side of the image, a table holds two yellow hard hats and clear face shields. The text 'ELEMENTOS DE PROTECCIÓN PERSONAL' is overlaid on the left side of the image in white, bold, uppercase letters, with a white horizontal line underneath it.

# ELEMENTOS DE PROTECCIÓN PERSONAL

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**LA TRASMISIÓN ES POR CONTACTO  
Y GOTAS (toser o estornudar)**



# PRECAUCIONES POR CONTACTO y GOTAS

[https://www.paho.org/hq/index.php?option=com\\_docman&view=download&alias=51729-prevencion-y-control-de-infecciones-durante-la-atencion-sanitaria-de-casos-en-los-que-se-sospecha-una-infeccion-por-el-nuevo-coronavirus-ncov&category\\_slug=materiales-cientificos-tecnicos-7992&Itemid=270&lang=es](https://www.paho.org/hq/index.php?option=com_docman&view=download&alias=51729-prevencion-y-control-de-infecciones-durante-la-atencion-sanitaria-de-casos-en-los-que-se-sospecha-una-infeccion-por-el-nuevo-coronavirus-ncov&category_slug=materiales-cientificos-tecnicos-7992&Itemid=270&lang=es)

# CONSIDERACIONES EN EL USO DE BATA

“Durante el contacto con los pacientes, **las batas son contaminadas** por microorganismos multiresistentes hospitalarios” (1,2), además de esto “**Los uniformes del personal de salud se contaminan** en la región abdominal, mas no en otros sitios” (3).

**DEBIDO A ESTO LAS BATAS NO SON REUTILIZABLES Y SE DEBEN DESECHAR LUEGO DE LA ATENCIÓN**

- (1) Morgan DJ et al. Frequent multirug-resistant *Acinetobacter baumannii* contamination of gloves, gowns and hands of healthcare workers. *Infect Control Hosp Epidemiol* 2010; 31 (7): 716-721.
- (2) Snyder GM et al. Detection of methicillin-resistant *Staphylococcus aureus* and vancomycin-resistant *Enterococci* on the gowns and gloves of healthcare workers. *Infect Control Hosp Epidemiol* 2008; 29 (7): 583-9.
- (3) Pilonetto M et al. Hospital gowns as a vehicle for bacterial dissemination in an intensive care unit. *Braz J Infect Dis*. 2004; 8 (3): 206-10

# EL PELIGRO DE USAR GANTES

## *Cuando no están indicados*

- Contaminación del guante: **66%**.
- Retiro adecuado (un solo uso): **64%**.
- Trasmisión cruzada: **>20%**.
- Mala adherencia a higiene de manos: **61%-74%**.





EL MITO

*“Debo usar N95 todo el tiempo, de lo contrario me contagiareé”*

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*Christina*

# ¿POR QUÉ NO USAR RUTINARIAMENTE LA N95?

- Son difíciles de tolerar y están asociadas a síntomas de cansancio como cefalea en trabajadores de salud.
- Su mal uso incrementa el riesgo de infección cruzada.

- Nickell LA, Crighton EJ, Tracy CS, et al. Psychosocial effects of SARS on hospital staff: survey of a large tertiary care institution. CMAJ 2004; 170:793-8.

- Love RG. Acceptable breathing resistance for respirator use. J Int Soc Respir Protection 1983; 1:45-66. 16.

- Kao TW. The physiological impact of N95 masks on medical staff [online] Available at: <http://clinicaltrials.gov/ct/show/NCT00173017>. Accessed February 13, 2014. 17.

- Lim EC, Seet RC, Lee KH, et al. Headaches and the N95 face-mask amongst healthcare providers. Acta Neurol Scand 2006; 113:199-202. 18.

- Dwosh H, Hong H, Austgarden D, Herman S, Schabas R. Identification and containment of an outbreak of SARS in a community hospital. CMAJ 2003; 168:1415-1420

- Ofner M, Lem M, Sarwal S, Vearncombe A. Cluster of severe acute respiratory syndrome cases among protected health-care workers—Toronto, Canada. MMWR Morb - Mortal Wkly Rep 2003; 52:433-436

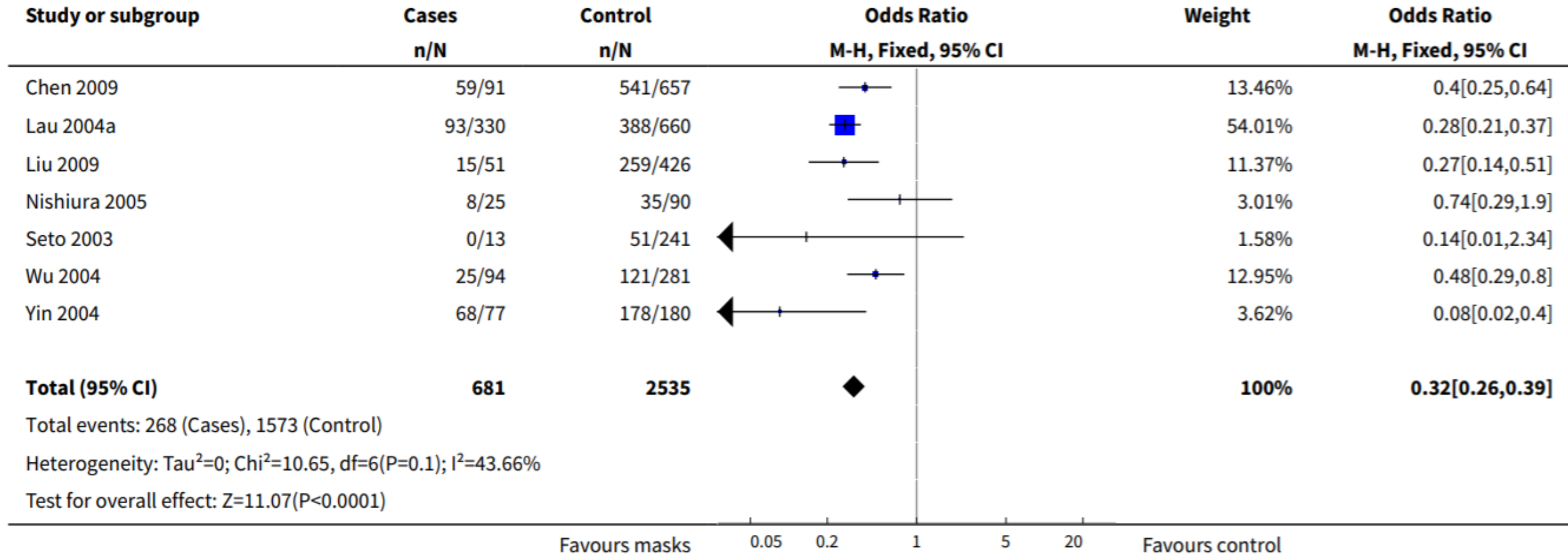
- Ofner-Agostini, et al., Cluster of Severe Acute Respiratory Syndrome Among Toronto Healthcare Workers After Implementation of Infection Control Precautions: A Case Series Infect Control Hosp Epidemiol 2006; 27: 473-478.



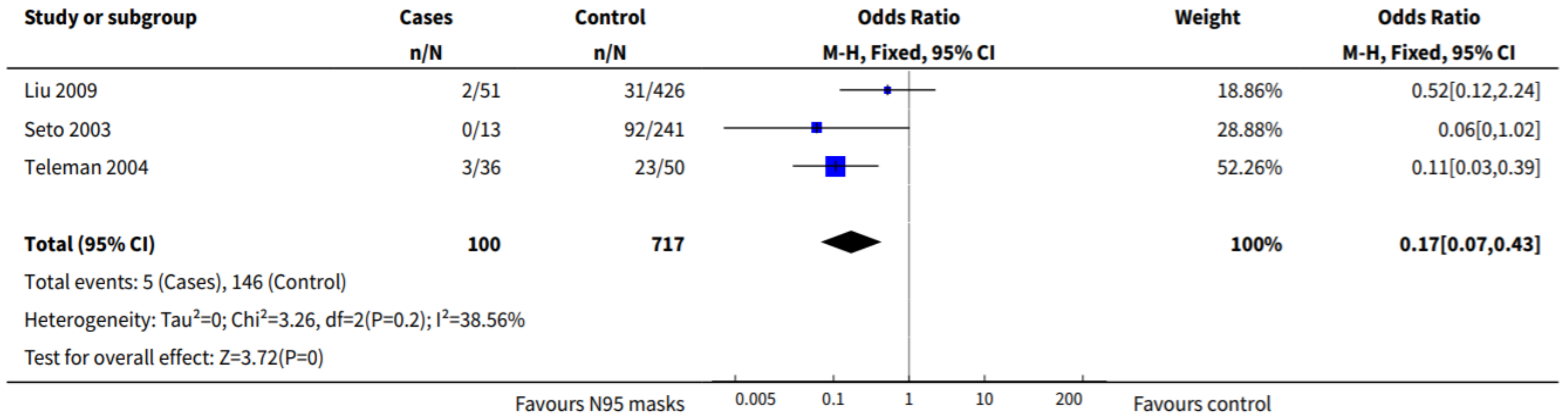
# MODELO CERCANO: SARS-COV-1

- Mascarillas (OR = 0.13; 95% CI: 0.03–0.62)  
Hasta 38% en el peor de los escenarios
- N95 (OR = 0.12; 95% CI: 0.06–0.26)  
Hasta 74% en el peor de los escenarios.

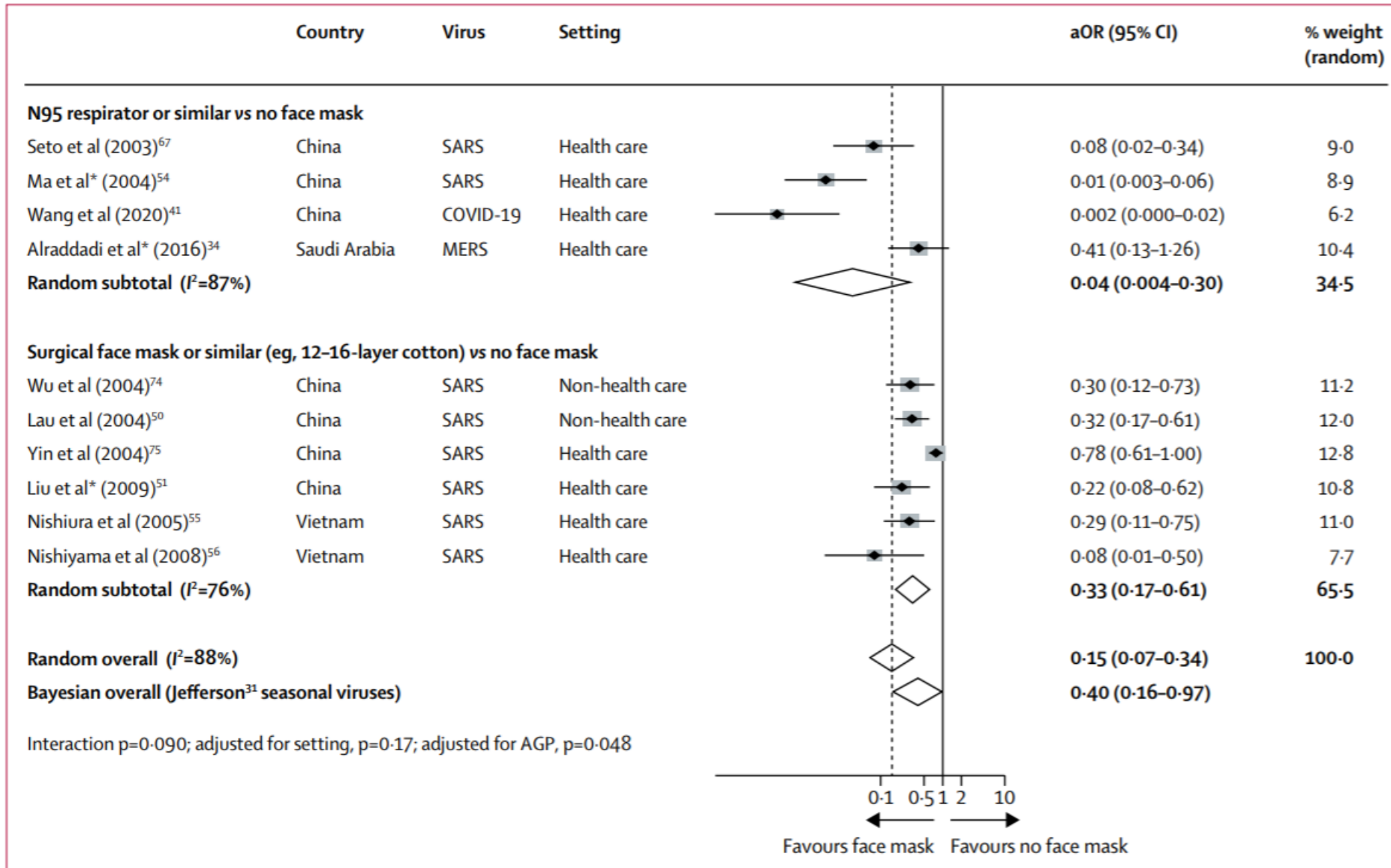
# PRECAUCIONES POR GOTAS: *Uso de mascarilla quirúrgica*



# PRECAUCIONES POR GOTAS: *Uso de mascarilla N95*

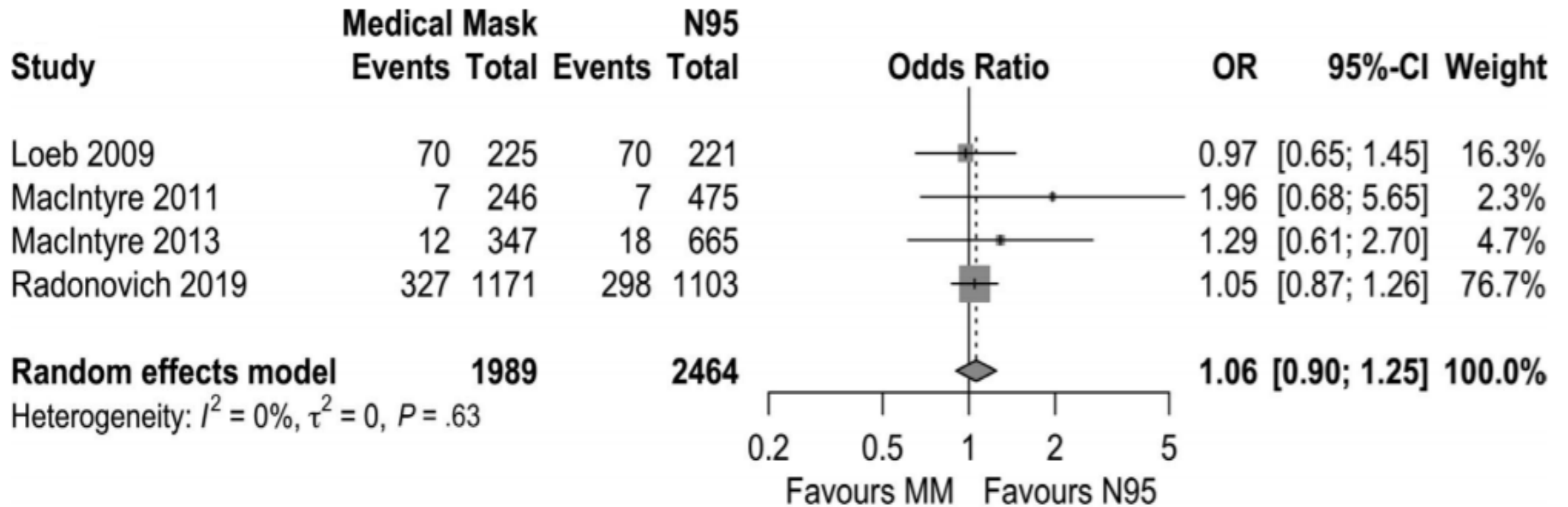


# PRECAUCIONES POR GOTAS: Mascarillas



# MODELOS EN VIRUS

(incluyendo Coronavirus)

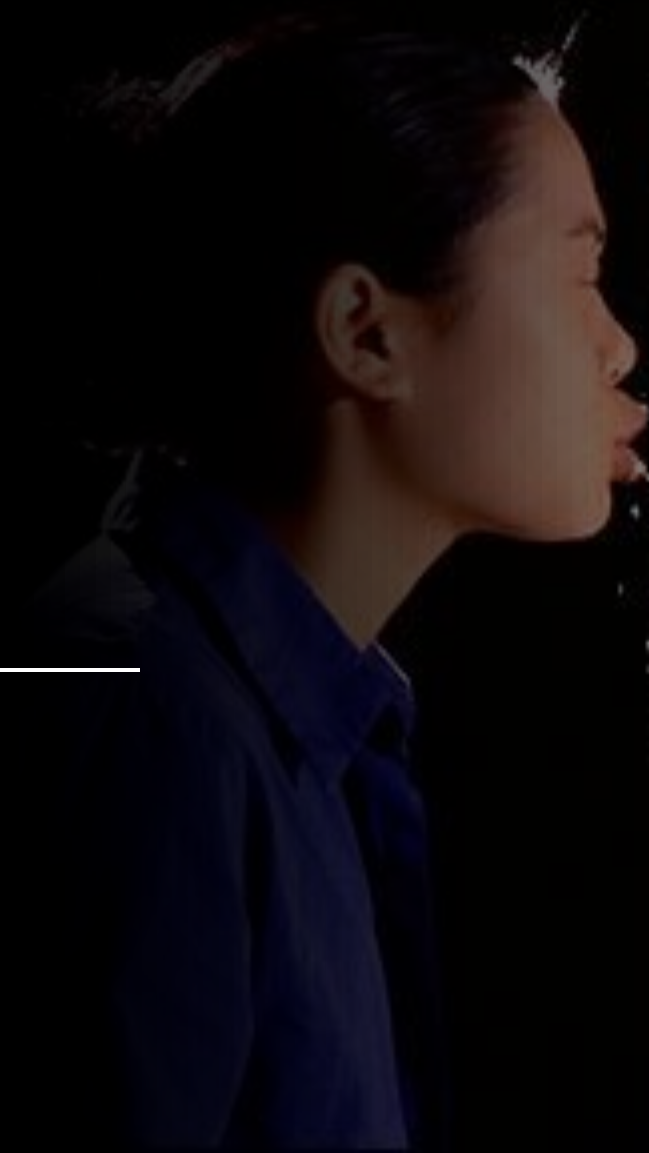


Jessica J. Bartoszko, Mohammed Abdul Malik Farooqi, Waleed Alhazzani, Mark Loeb. Medical masks vs N95 respirators for preventing COVID-19 in healthcare workers: A systematic review and meta-analysis of randomized trials. *Influenza Other Respi Viruses*. 2020;00:1–9.



# AEROSOLS

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# PROCEDIMIENTOS Y AEROSOLES

*Los que tienen algún nivel de evidencia*

## ***Intubación endotraqueal:***

Cuatro estudios de cohorte OR=6.0 IC95%: 2,3-18,9

Cuatro estudios de casos y controles OR=6.6 IC95%: 4,1-10,6

## ***Ventilación no invasiva:***

Dos estudios de cohorte OR=3.1 IC95%: 1,4-6,8

## ***Traqueostomía:***

Un estudio de casos y controles OR=4.2 IC95%: 1,5-11,5

## ***Ventilación manual antes de la intubación:***

Un estudio de cohorte OR=2.8 IC95%: 1,3-6,4



# ¿CIRUGÍAS?

- No se ha publicado evidencia científica que demuestre un mayor riesgo de transmisión de SARS-CoV-2/COVID-19 con la cirugía laparoscópica y permita concluir que se debe preferir el abordaje abierto.
- No hay evidencia que indique que el uso de electrocirugía durante la laparoscopia aumente el riesgo de transmisión de la enfermedad a través del humo quirúrgico o el neumoperitoneo.
- La evidencia de virus respiratorios similares, como la gripe y otros coronavirus (SARS y MERS), no ha demostrado transmisión de la enfermedad a través del neumoperitoneo ni del humo quirúrgico.

- 1) SAGES. Resources for smoke & gas evacuation during open, laparoscopic, and endoscopic procedures. 2020 March 29. Disponible en: <https://www.sages.org/resources-smoke-gas-evacuation-during-open-laparoscopic-endoscopic-procedures>.
- 2) Zheng MH, Boni L, Fingerhut A. Minimally invasive surgery and the novel coronavirus outbreak: Lessons learned in China and Italy. Annals of Surgery. 2020 Mar 26. <https://doi/10.1097/SLA.0000000000003924>
- 3) The Royal College of Surgeons on Edinburgh. Intercollegiate General Surgery Guidance on COVID-19 update. Disponible en: <https://www.rcsed.ac.uk/news-public-affairs/news/2020/march/intercollegiate-general-surgery-guidance-on-covid-19>
- 4) Alp E, Bijl D, Bleichrodt RP, Hansson B, Voss A. Surgical smoke and infection control. J Hosp Infect. 2006 Jan;62(1):1–5.
- 5) Xiao F, Tang M, Zheng X, Liu Y, Li X, Shan H. Evidence for gastrointestinal infection of SARS-CoV-2. Gastroenterology. March 2020. <https://doi/10.1053/j.gastro.2020.02.0556>.
- 6) Brat GA, Hersey SP, Chhabra K, Gupta A, Scott J. Protecting surgical teams during the COVID-19 outbreak: A narrative review and clinical considerations. Annals of surgery. 2020 [Online ahead of print]. Disponible en: [https://umbraco.surgeons.org/media/5164/covid-surgery\\_vf.pdf](https://umbraco.surgeons.org/media/5164/covid-surgery_vf.pdf)





## EL MITO

*“Las máscaras full face o P100  
me protegen más del COVID-19  
que una N95”*

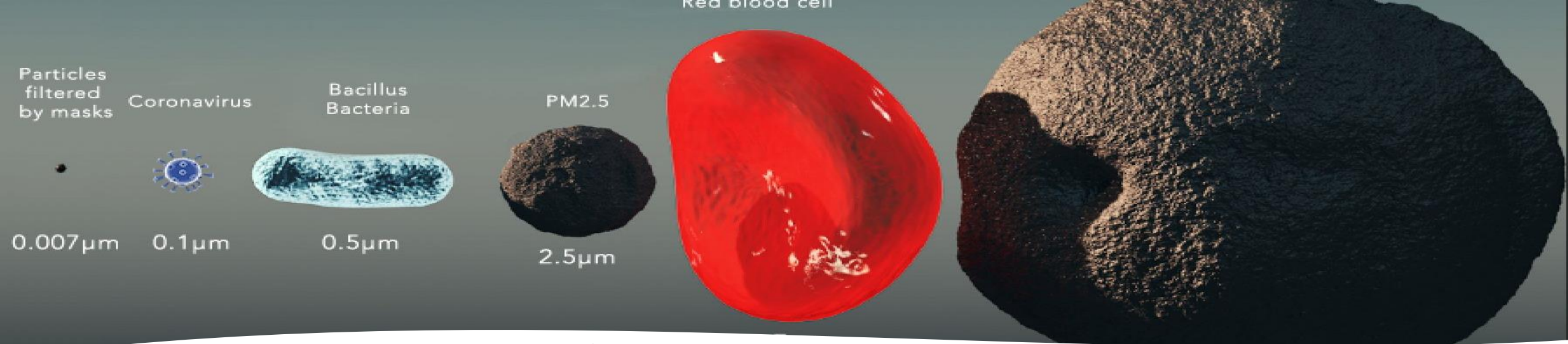
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# ¿CUAL ES MEJOR?

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# PRUEBAS DE LAS N95 PARA MEDIR EFICACIA

*En partículas <0,3/0,1 y 0,06 micras*

- 1) N Engl J Med 2020; 382:727-733
- 2) <https://smartaifilters.com/en/blog/what-is-pm0-3-why-important/>
- 3) Hinds, W.C.: Aerosol Technology: Properties, Behavior and Measurement of Airborne Particles. New York: John Wiley & Sons, 1999.
- 4) Lenhart, S.W., Seitz, T., Trout, D. and N. Bollinger. Issues affecting respirator selection for workers exposed to infectious aerosols: emphasis on healthcare settings. Applied Biosafety. 9(1):20-36; 2004.
- 5) American Conference of Governmental Industrial Hygienists (ACGIH). Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. ACGIH. 2009.
- 6) Holden, K.L. Unmasking leading to a healthcare worker Mycobacterium tuberculosis transmission. Journal of Hospital Infection. 100(4): e226-e232, 2018.
- 7) Blachere, F.M., Lindsley, W.G., Pearce, T.A., Anderson, S.E., Fisher, M., Khakoo, R., Meade, B.J., Lander, O., Davis, S., Thewlis, R.E., Celik, I., Chen, B., and D.H. Beezhold. Measurement of airborne influenza virus in a hospital emergency department. Clinical Infectious Diseases. 48:438-40; 2009.
- 8) Stelzer-Braid, S., Oliver, B.G., Blazey, A.J., Argent, E., Newson, T.P., Rawlinson, W.D. and E.R. Tovey. 2009. Exhalation of respiratory viruses by breathing, talking and coughing. Journal of Medical Virology. 81:1674-1679.
- 9) R. Aerosol transmission of influenza A virus: a review of new studies. J.R. Soc. Interface. 6(Suppl 6): S783-S790; 2009.
- 10) Yu, I.T.S., Wong, T.W., Chiu, Y.L., Lee, N. and Y. Li. Temporal-spatial analysis of Severe Acute Respiratory Syndrome among hospital inpatients. Clinical Infectious Diseases. 40:1237-1243; 2005.
- 11) Yu, I.T.S., Li, Y., Wong, T.W., Tam, W., Chan, A.T., Lee, J.H.W., Leung, D.Y.C., and T. Ho. Evidence of airborne transmission of the Severe Acute Respiratory Syndrome Virus. The New England Journal of Medicine. 350(17): 1731-1739; 2004.
- 12) Memarzadeh F, Manning AP. Comparison of operating room ventilation systems in the protection of the surgical site. ASHRAE Transactions. 2002;108(2):3-15
- 13) American Conference of Governmental Industrial Hygienists: Bioaerosols Assessment and Control, J. Macher (ed.), Cincinnati, OH: American Conference of Governmental Industrial Hygienists, 1999.
- 14) Oberg, T. and L. Brosseau. Surgical mask filter and fit performance. American Journal of Infection Control. 36(4):276-282; 2008.
- 15) MacIntyre, C.R., Wang, Q., Rahman, B., Seale, H., Ridda, I., Gao, Z., Yang, P., Shi, W., Pang, X., Zhang, Y., Moa, A., and D.E.
- 16) Dwyer. Efficacy of face masks and respirators in preventing upper respiratory tract bacterial colonization and co-infection in hospital healthcare workers. Preventive Medicine. 62:1-7; 2014.
- 17) Cole, E.C. and C.E. Cook: Characterization of Infectious Aerosols in Health Care Facilities: An aid to Effective Engineering Controls and Preventive Strategies. American Journal of Infection Control. 26:453-64; 1998.
- 18) Morawska L, Johnson GR, Ristovski ZD, Hargreaves M, Mengersen K, Corbett S, Chao CYH, Li Y, and D. Katoshevski. Sizedistribution and sites of origin of droplets expelled from the human respiratory tract during expiratory activities. J Aerosol Sci 40:256-269; 2009.
- 19) Stelzer-Braid, S., Oliver, B.G., Blazey, A.J., Argent, E., Newsome T.P., Rawlinson, W.D., and E. R. Tovey. 2009. Exhalation of Respiratory Viruses by Breathing, Coughing, and Talking. J Med Virol. 81:1674-1679; 2009.
- 20) Centers for Disease Control and Prevention. Guidelines for Preventing the Transmission of Mycobacterium Tuberculosis in Health-care Facilities. MMWR Morb. Mortal Wkly. Rep. 43 (RR-1—RR-13); 1994.
- 21) Fennelly, K.P. et al.: Cough-Generated Aerosols of Mycobacterium Tuberculosis: A New Method to Study Infectiousness. Am. J. Resp. Crit. Care. 169:604-609; 2004.
- 22) Lee, K.W. and B.Y.H. Liu. On the Minimum Efficiency and the Most Penetrating Particle Size for Fibrous Filters. Air Pollution Control Association Journal. 30(4): 337-381; 1972.
- 23) Chen, S.K., Vesley, D., Brosseau, L.M., and J. H. Vincent. Evaluation of single-use masks and respirators for protection of health care workers against mycobacterial aerosols. Am. J. Infect. Control. 22:65-74; 1994.
- 24) Qian, Y., Willeke, K., Grinshpun, S.A., Donnelly, J. and C.C. Coffey. Performance of N95 respirators: Filtration efficiency for airborne microbial and inert particles. AIHA Journal. 59:128-132; 1998.
- 25) Willeke, K., Qian, Y., Donnelly, J., Grinshpun, S.A. and V. Ulevicius. Penetration of airborne microorganisms through a surgical mask and a dust/mist respirator. AIHA Journal. 57:348-355; 1996
- 26) Garner, P.D., Eshbaugh, J.P., Harpest, S.D., Richardson, A.W., and K.C. Hofacre. Viable viral efficiency of N95 and P100. Environ. Hyg. 10(10):564-572; 2013.
- 27) Harnish, D.A., Heimbuch, B.K., Husband, M., Lumley, A.E., Kinney, K., Shaffer, R.E., and J.D. Wander. Challenge of N95 filtering facepiece respirators with viable H1N1 influenza aerosols. Infect. Cont. Hosp. Ep. 34(5): 494-499; 2013.
- 28) Balazy, A., M. Taivola, A. Adhikari, S.K. Sivasubramani, T. Reponen and S.A. Grinshpun. Do N95 respirators provide 95% protection level against airborne viruses and how adequate are surgical masks. Am. J. Infect. Control. 34:51-57; 2006.
- 29) Eninger, R.M., Honda, T., Adhikari, A., Heinonen-Tanski, H., Reponen, T. and S. A. Grinshpun. Filter Performance of N99 and N95 Facepiece Respirators against Viruses and Ultrafine Particles. Ann. Occup. Hyg. 52(5):385-396; 2008.
- 30) Rengasamy, S., Eimer, B.C. and R.S. Shaffer. Comparison of Nanoparticle Filtration Performance of NIOSH-approved and CE-Marked Particulate Filtering Facepiece Respirators. Ann. Occup. Hyg. 53(2): 117-128; 2009.
- 31) Rengasamy, S., Verbofsky, R., King, W.P. and R. E. Shaffer. Nanoparticle Penetration through NIOSH-Approved N95 Filtering Facepiece Respirators. Journal of the International Society for Respiratory Protection. Vol. 24: 49-59; 2007.
- 32) Lore, M.B., Sambol, A.R., Japuntich, D.A., Franklin, L.M. and S.H. Hinrichs. Inter-laboratory performance between two nanoparticle air filtration systems using scanning mobility particle analyzers. Journal of Nanoparticle Research. 13:1581-1591; 2011.
- 33) Lore, M.B., Sebastian, J.M., Brown, T.L., Viner, A.S., McCullough, N.V. and S.H. Hinrichs. Performance of Conventional and Antimicrobial-Treated Filtering Facepiece Respirators Challenged with Biological Aerosols. Journal of Occupational and Environmental Hygiene. 9(2):69-80, 2011.
- 34) Hinrichs, S.H., Lore, M.B. and Brown, T.L. Filtration Performance of Five Respirator Models when Challenged with H1N1 and H5N1 Influenza Virus Aerosols. 20 October 2010 Report from University of Nebraska Medical Center to 3M Company. 2010.
- 35) Brosseau, L.M., McCullough, N.V., and D. Vesley. Bacterial survival on respirator filters and surgical masks. J. Am. Biol. Saf. Assoc. 2:232-243; 1997.
- 36) Reponen, T.A., Wang, Z., Willeke, K. and S.A. Grinshpun. Survival of mycobacteria on N95 personal respirators. Infect. Control Hosp. Epidemiol. 20:237-241; 1999.
- 37) Wang, Z., Reponen, T.A. and K. Willeke. Survival of bacteria on respirator filters. Aerosol Sci. Tech. 30 (3), pp. 300-308; 1999.
- 38) Johnson, B., Winters, D.R., Shreeve, T.R. and C.C. Coffey. Respirator filter reuse test using the laboratory simulant mycobacterium tuberculosis (H37Ra strain). J. Am. Biol. Saf. Assoc. 3:105-116; 1998.
- 39) Pasanen, A., Nikulin, M., Berg, S. and E. Hintikka. Stachybotrys atra corda may produce mycotoxins in respirator filters in humid environments. American Industrial Hygiene Association Journal. 55:62-65; 1994.
- 40) Eninger, R.M., Adhikari, A., Reponen, T., and S.A. Grinshpun. Differentiating Between Physical and Viable Penetrations When Challenging Respirator Filters with Bioaerosols. Clean 36(7), 615-621; 2008.
- 41) Wu, C.-Y., Lee, J.-H., Riemenschneider, L. and A.D. Theodore. Evaluation of the performance of iodine-treated biocide filters challenged with bacterial spores and viruses. Air Force Research Laboratory Report, AFRL-RX-TY-TR-2008-4511; 2008.
- 42) Qian, Y., Willeke, K. Grinshpun, S.A and J. Donnelly. Performance of N95 respirators: re-aerosolization of bacteria and solid particles. Am. Ind. Hyg Assoc. J. 58:876-880; 1997.
- 43) Kennedy, N.J. and W.C. Hinds. Release of simulated anthrax particles from disposable respirators. J. Occ. Environ. Hyg. 1:7-10; 2004.

A wolf is shown in a dark, moody forest at night, howling with its head tilted back. The scene is illuminated by a large, bright full moon in the sky, which casts a soft glow on the surrounding trees and clouds. The wolf's fur is dark, and its eyes are visible. The overall atmosphere is mysterious and wild.

## EL MITO

*“Entre más cubierto esté,  
mucho más protegido”*

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***Existe muy baja evidencia que pruebe que cubrir más partes del cuerpo conduce a una mejor protección. Está demostrado que no sólo es más costoso, también influye en mayor contaminación y mas riesgo de contagio.***



COSAS QUE USTED NO  
NECESITA POR FUERA DEL  
HOSPITAL

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**PELIGRO**



**EVITE EL USO DE  
ACCESORIOS**

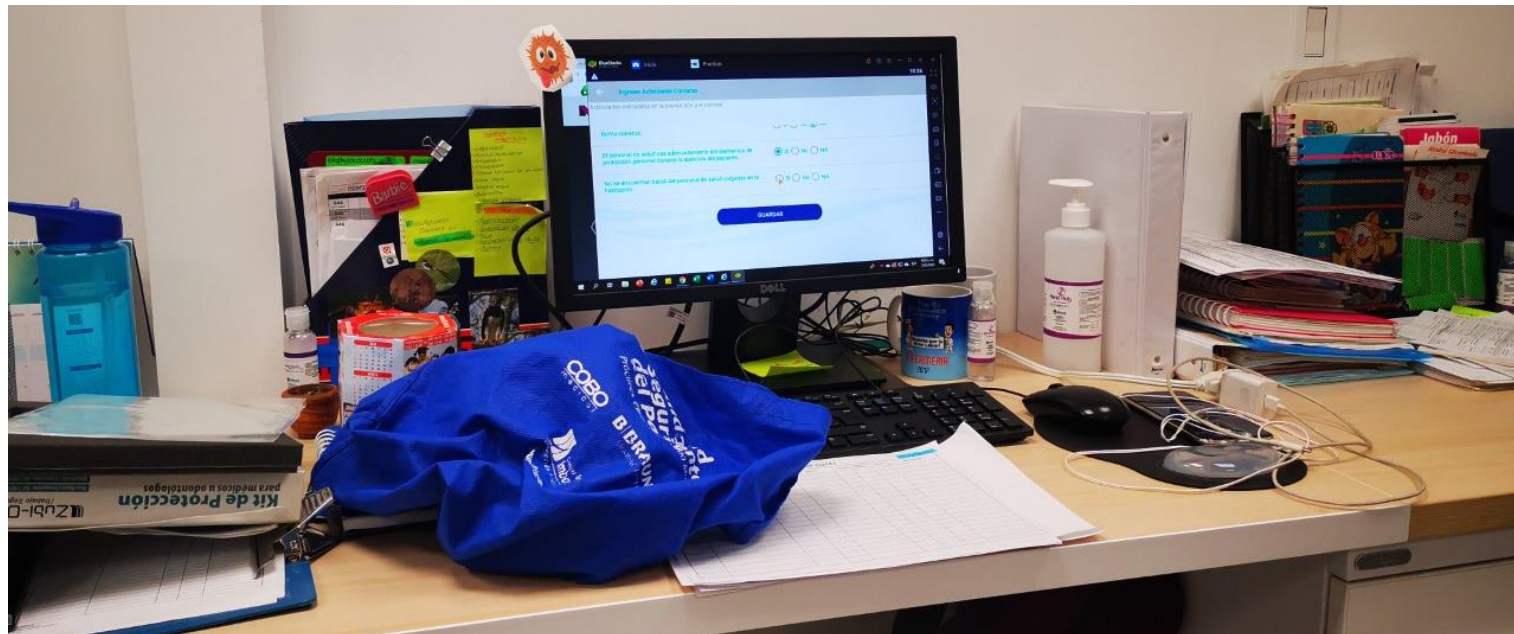
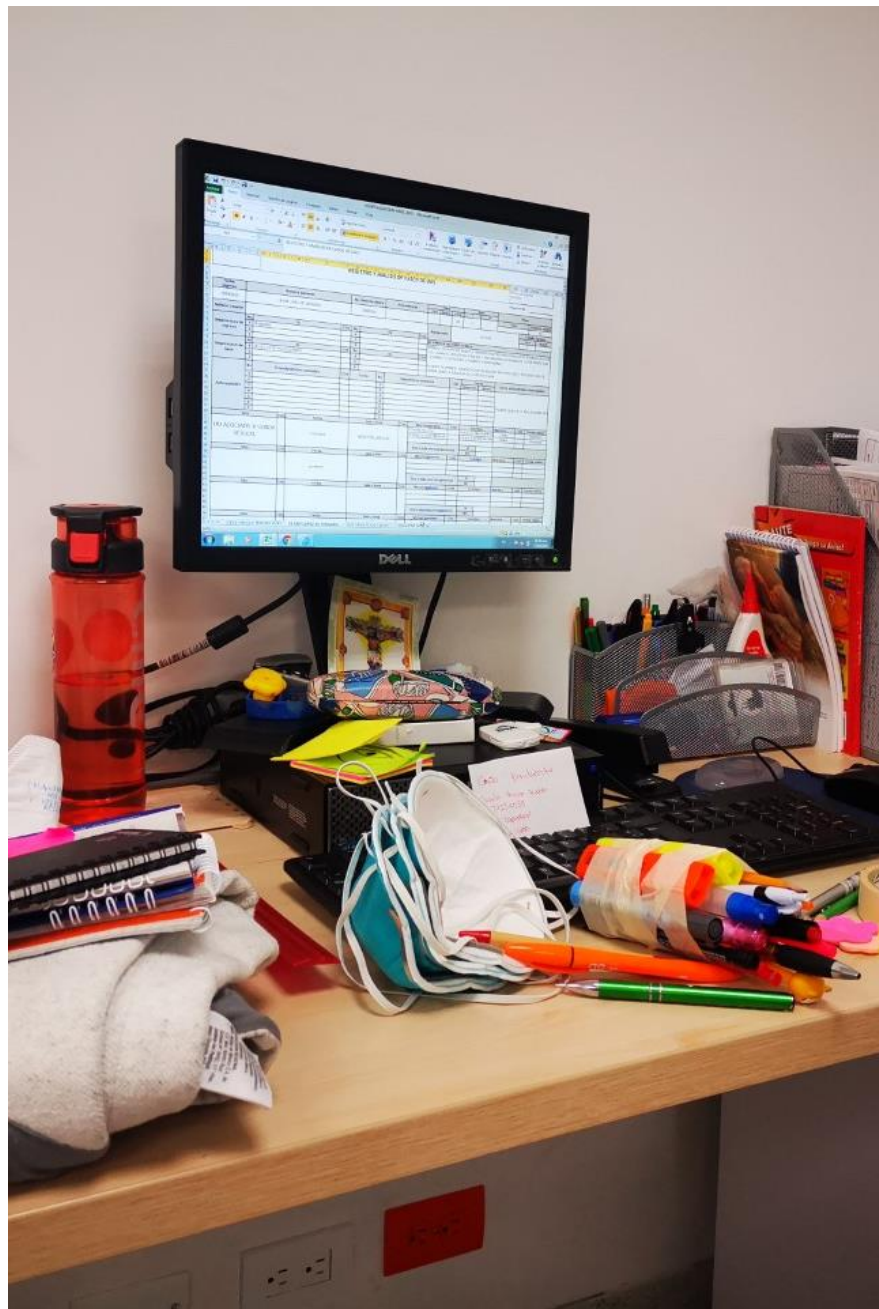
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**PELIGRO**

**IMPORTANTE:**  
**Aléjese** de cualquier persona  
enferma **DE INMEDIATO**





EN LA OFICINA:  
Que **NO** hacer

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EN LA OFICINA:  
*Que hacer*

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**PELIGRO**

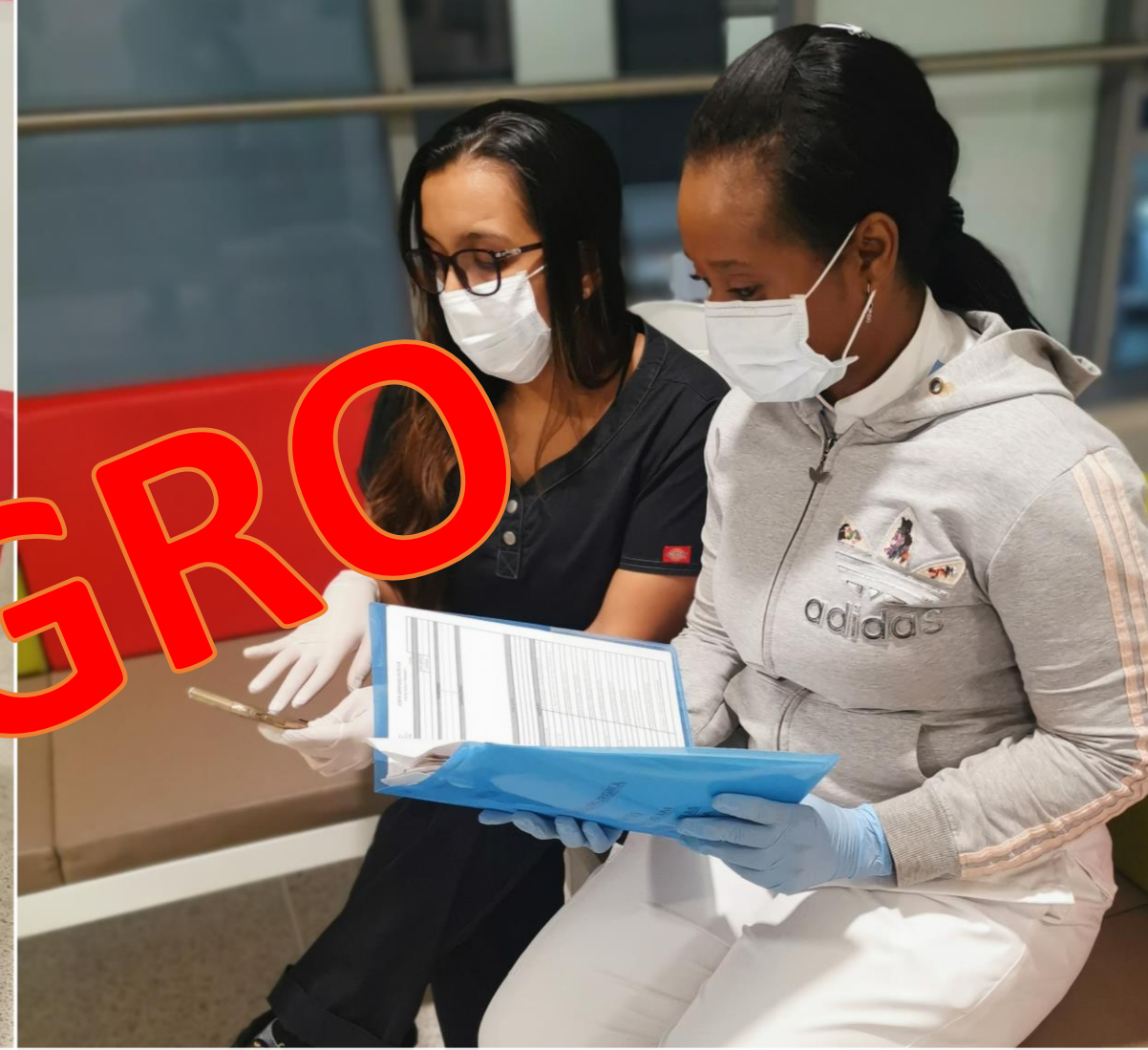
COMO ACTUAR EN  
ZONAS COMUNES

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Two women in white uniforms are standing on a balcony, looking out over a city. The word "PELIGRO" is written in large, red, outlined letters across the center of the image.

PELIGRO

QUE NO DEBE HACER EN ZONAS COMUNES



**PELIGRO**

QUE NO DEBE HACER EN ZONAS COMUNES

# TERAPIA FARMACOLÓGICA



**POR FAVOR NO SE AUTOMEDIQUEN**



Pruebas para detección



## EL MITO

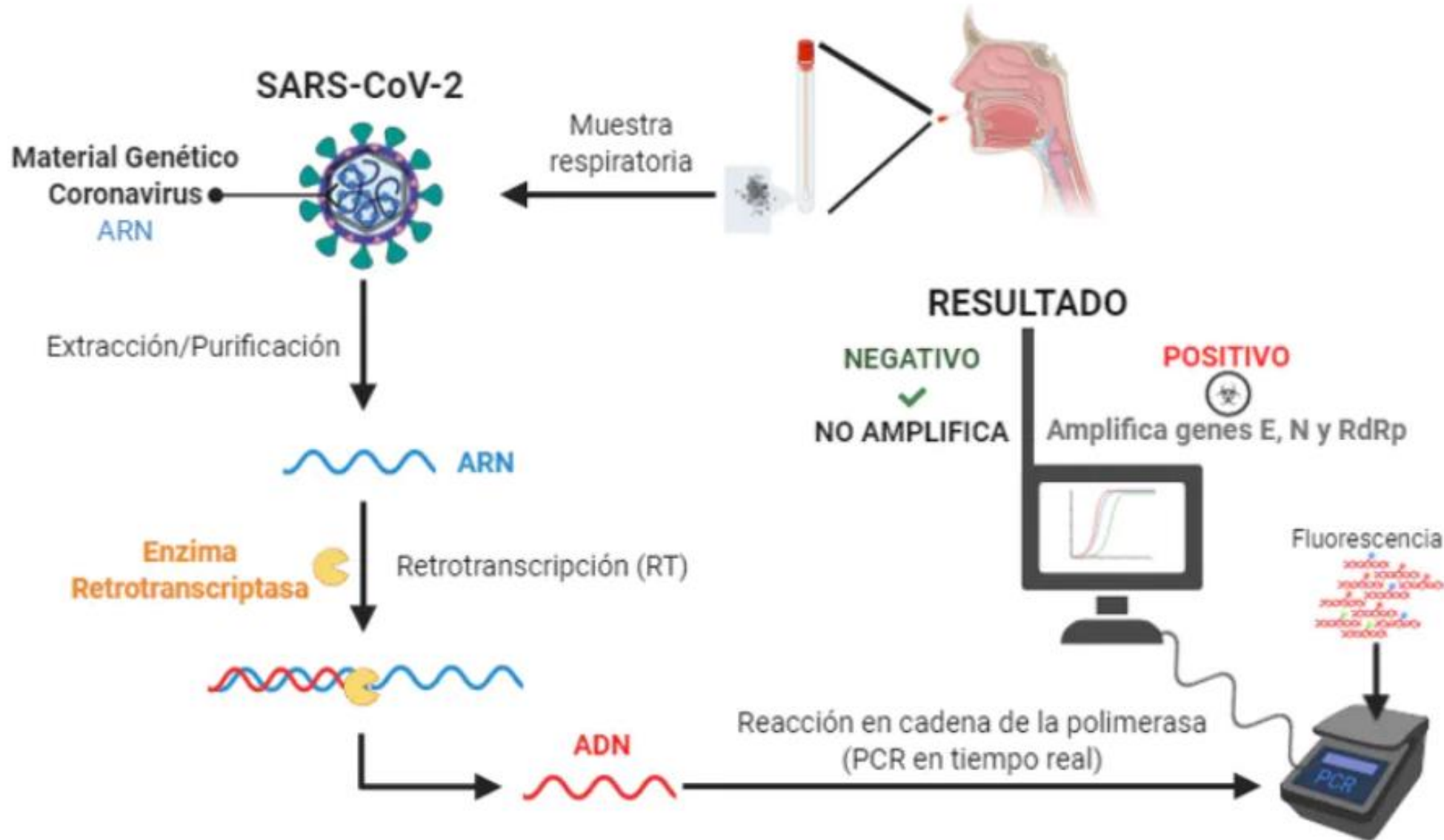
*“Necesito conocer mi estado, hacerme pruebas periódicamente”*

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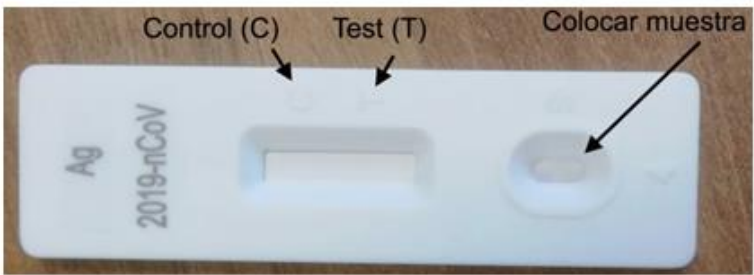
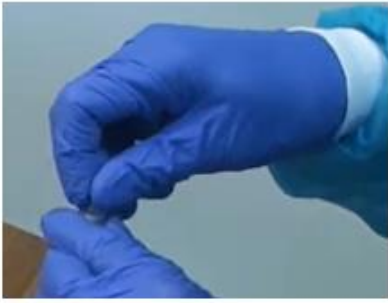
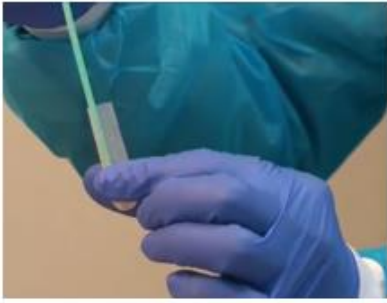
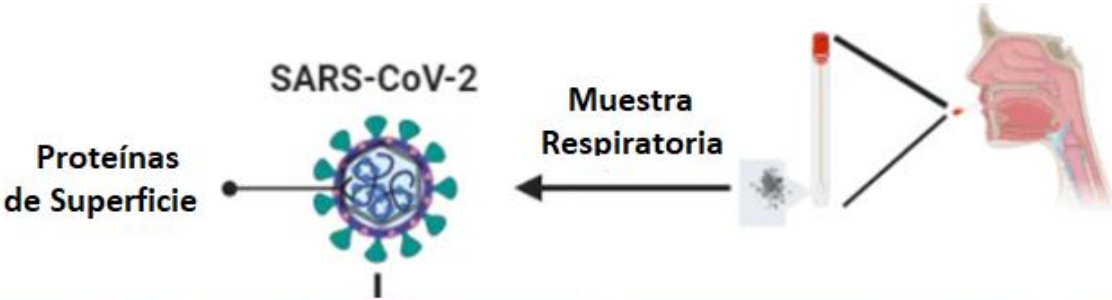




# 1. RT-PCR



# 2. ANTÍGENOS

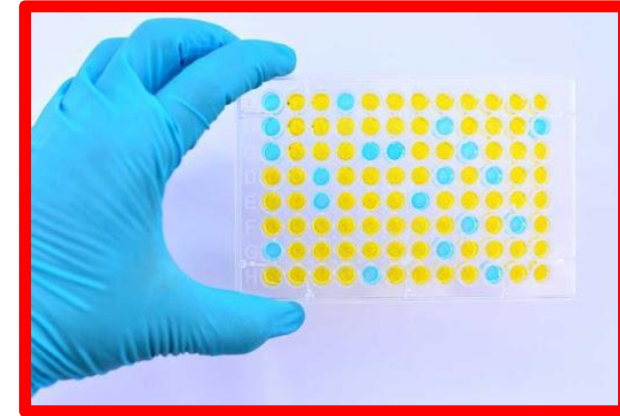


# 3. ANTICUERPOS

**INMUNOCROMATOGRAFÍA  
(casete)**



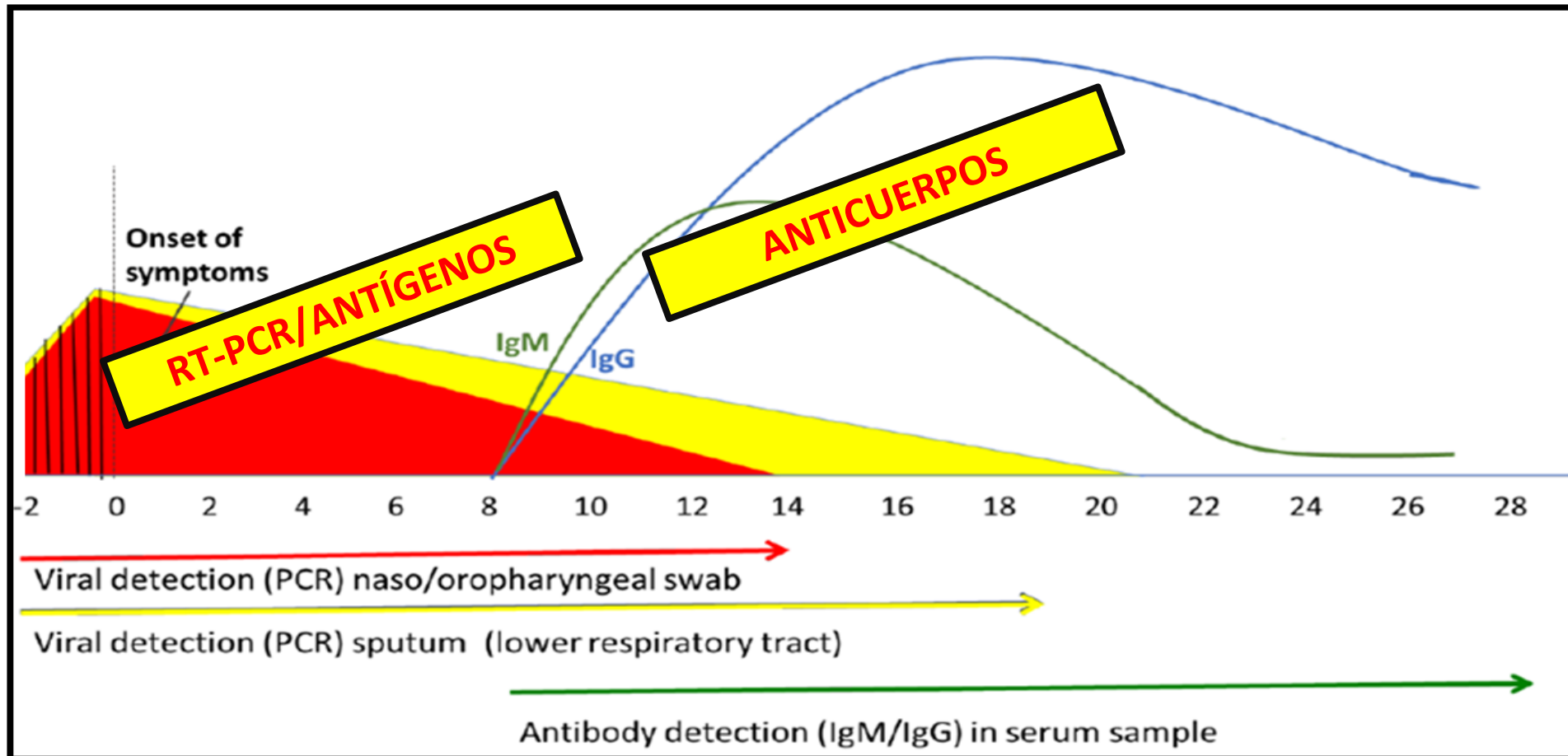
**INMUNOABSORCIÓN LIGADO A ENZIMAS  
(Elisa)**



**QUIMIOLUMINISCENCIA  
(CLIA)**



# TOMA DE PRUEBAS



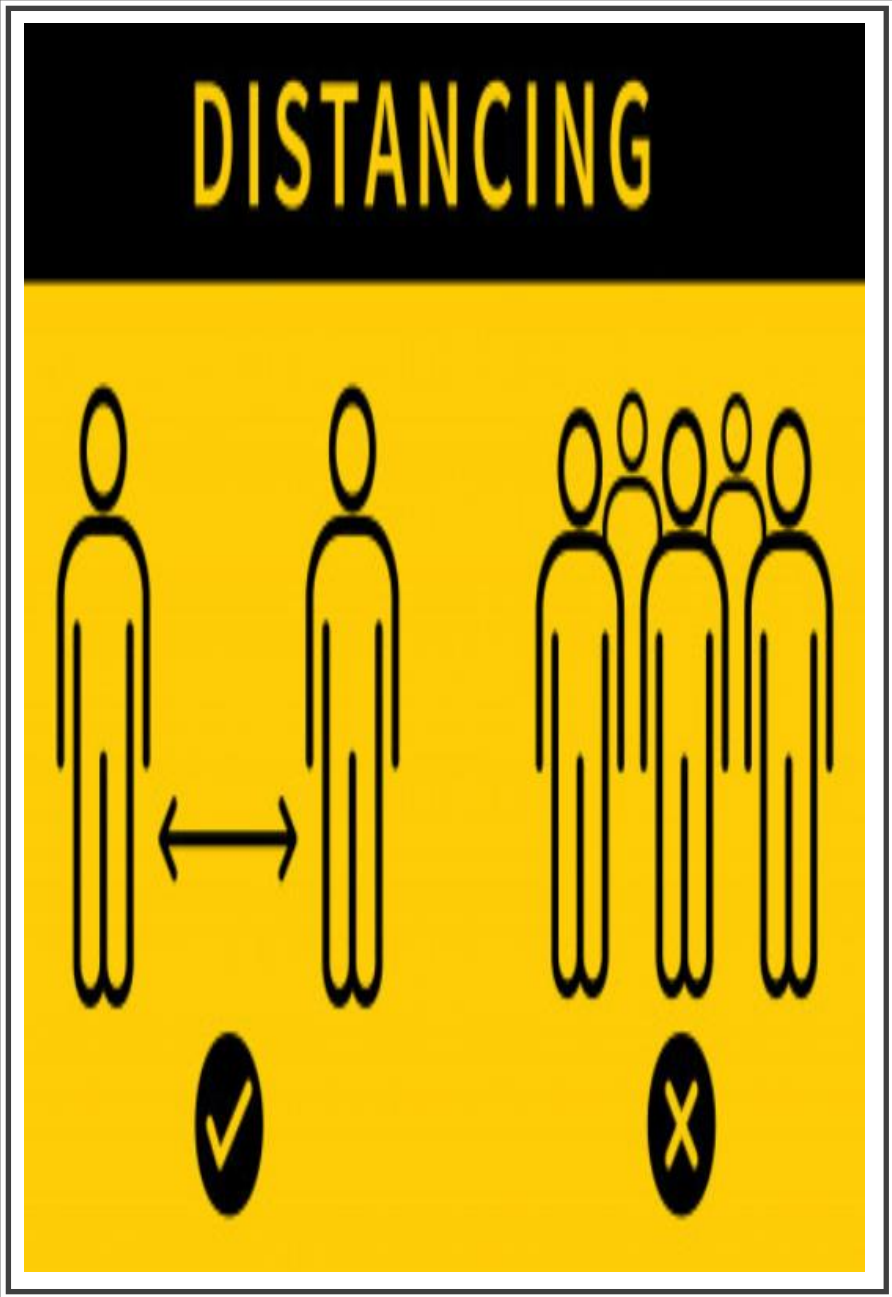
## PRUEBA DE RT-PCR / ANTÍGENOS

- Diagnóstico (sintomáticos)
- Seguimiento epidemiológico (contactos estrechos)

## PRUEBAS DE ANTICUERPOS “Rápidas”

- Investigación epidemiológica
- Sintomáticos (>10 días de síntomas)\*

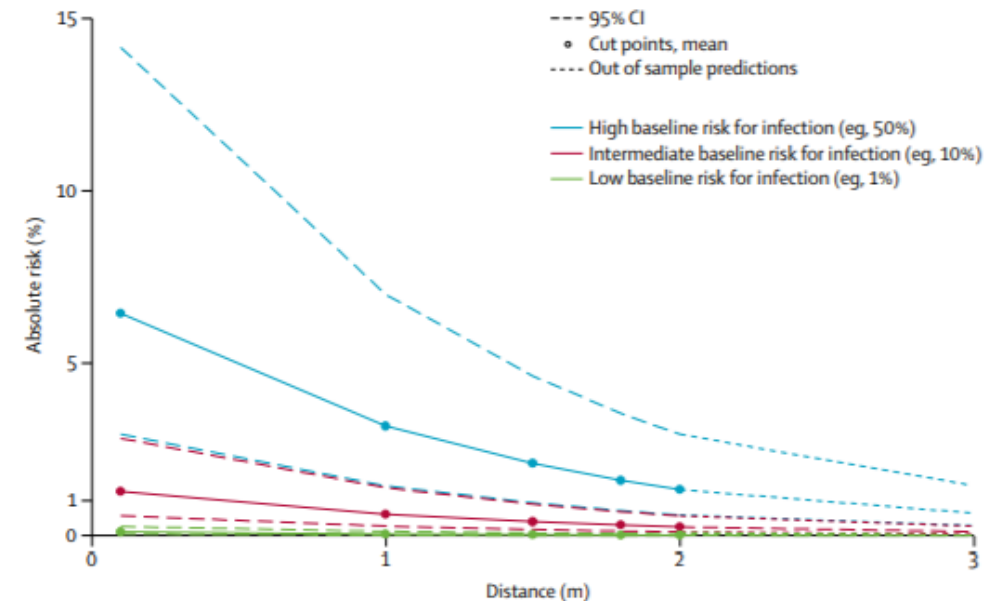
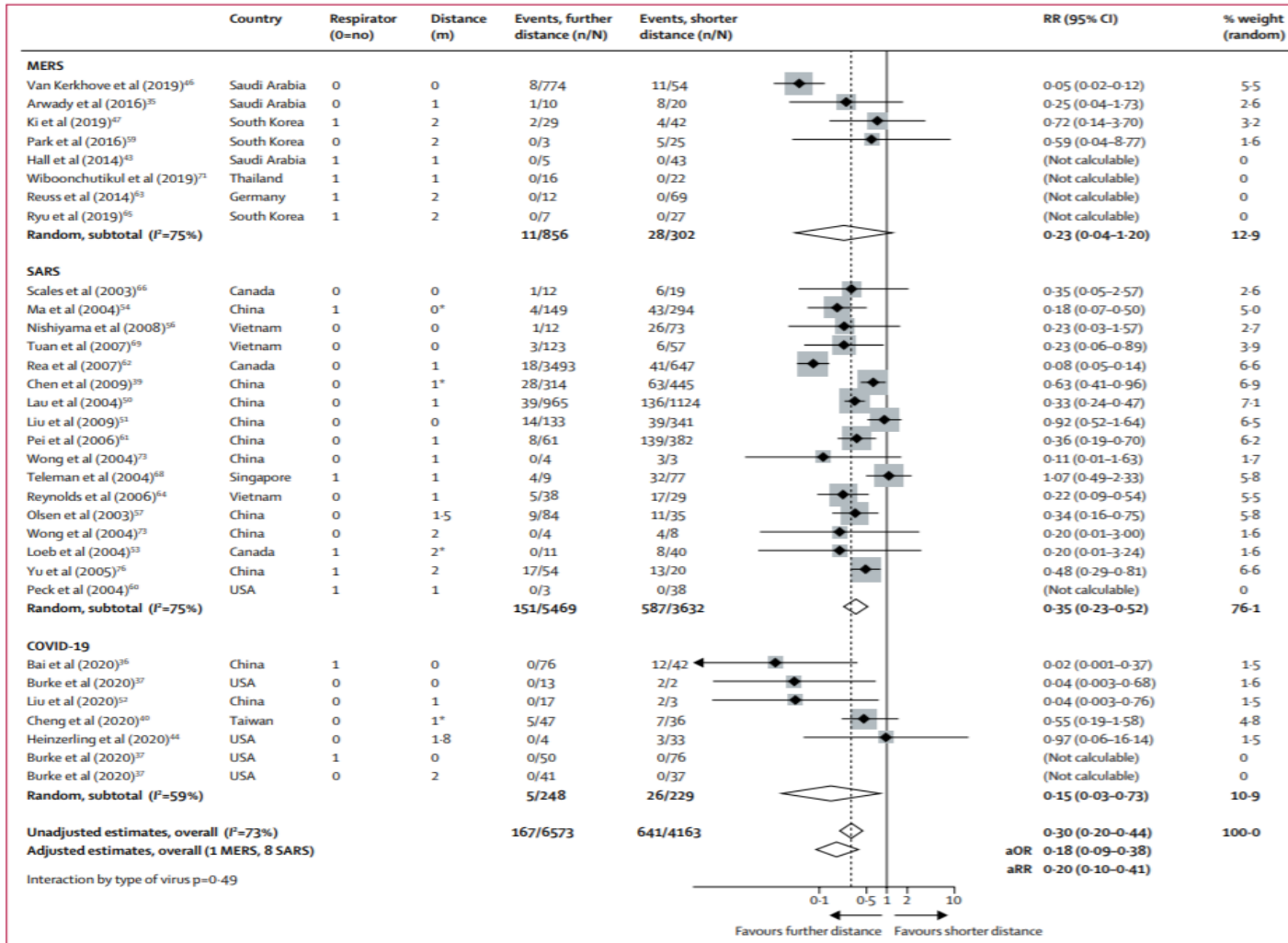
*\*Cualquier resultado se debe confirmar con RT-PCR*

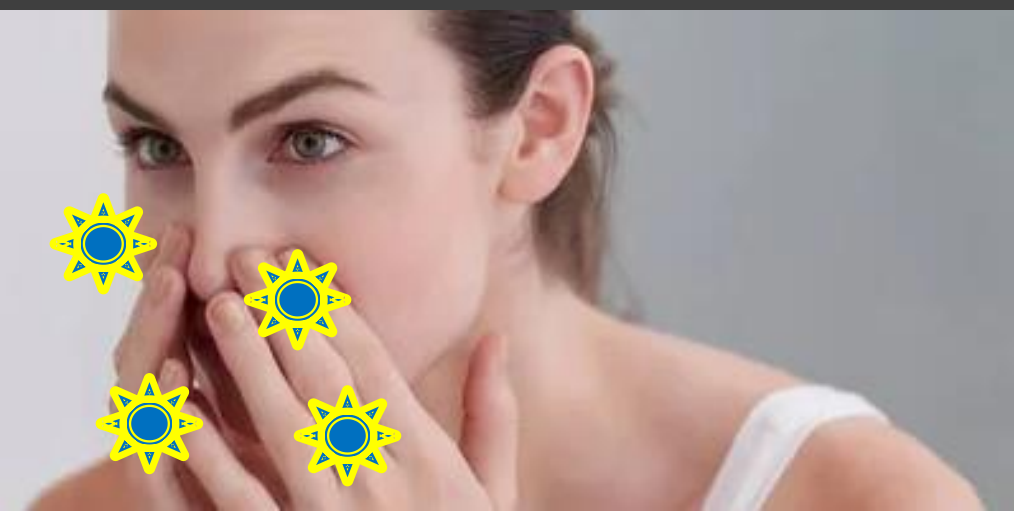


LA TRIADA FUNDAMENTAL  
PARA EVITAR EL CONTAGIO

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# DISTANCIAMIENTO FÍSICO





PRÁCTICA IMPORTANTE:  
*Higiene de manos*





PRÁCTICA IMPORTANTE:  
*Uso de tapabocas*

En este **2020 Positiva te acompaña**  
con una estrategia en acción

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**ES ACCIÓN**  
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**POSITIVA**  
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