

Burden of acute respiratory virus infections: An epidemiological perspective

Stefania Maggi

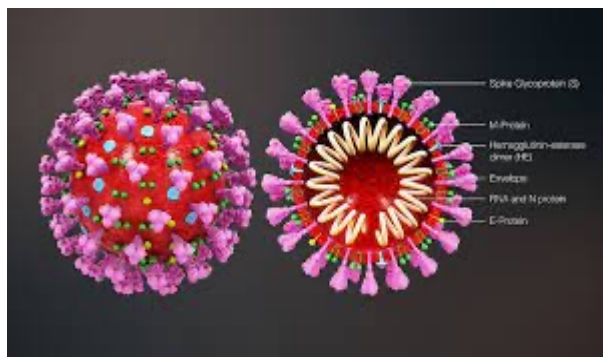
CNR Aging Branch

Padua (Italy)

Outline

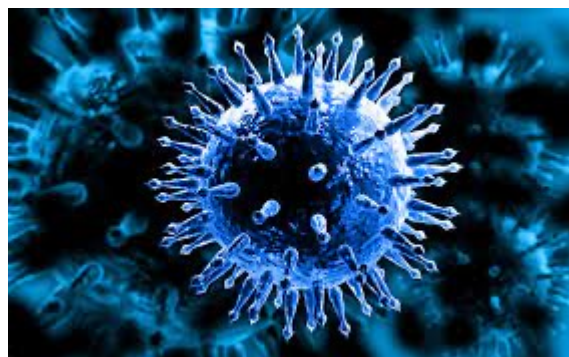
- Review epidemiological trends of common respiratory viral infections
- Review why older adults are more at risk of severe illness from respiratory viral infections
- Discuss the long-term consequences of common respiratory viral infections in the elderly population
- Discuss preventative approaches to mitigate the impact of respiratory viral infections

The European burden of the **triple**demic in older adults



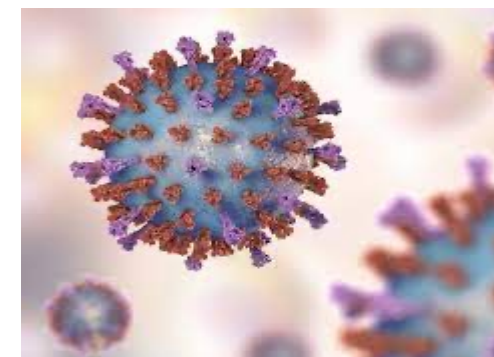
SARS-COV 2

About **276 million (36% of the worldwide cases of SARS-Cov2)** and caused about **2 million deaths**¹



INFLUENZA

Each year up to **50 million people contract symptomatic influenza**, resulting in an **estimated 15,000 to 70,000 flu-related deaths**², ~90% of deaths³ and 50-70% of hospitalisations are among older adults⁴



RSV

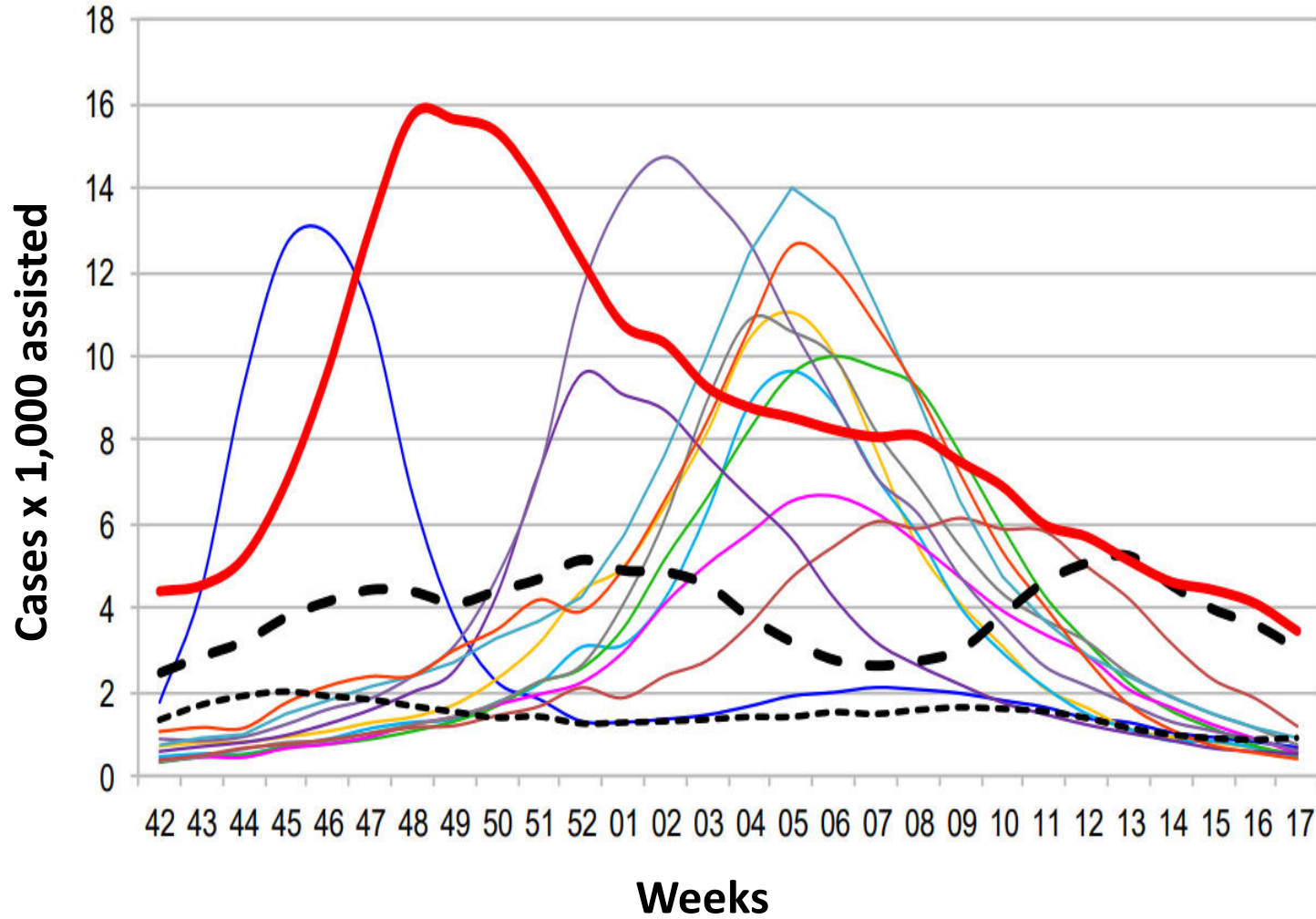
Hospitalisations for adults in the EU, Norway and the United Kingdom are on average 158 000 per year⁵. In LTC facilities the prevalence can reach 10%, with 20% risk of hospitalisation and 5% of death

LTC, long-term care

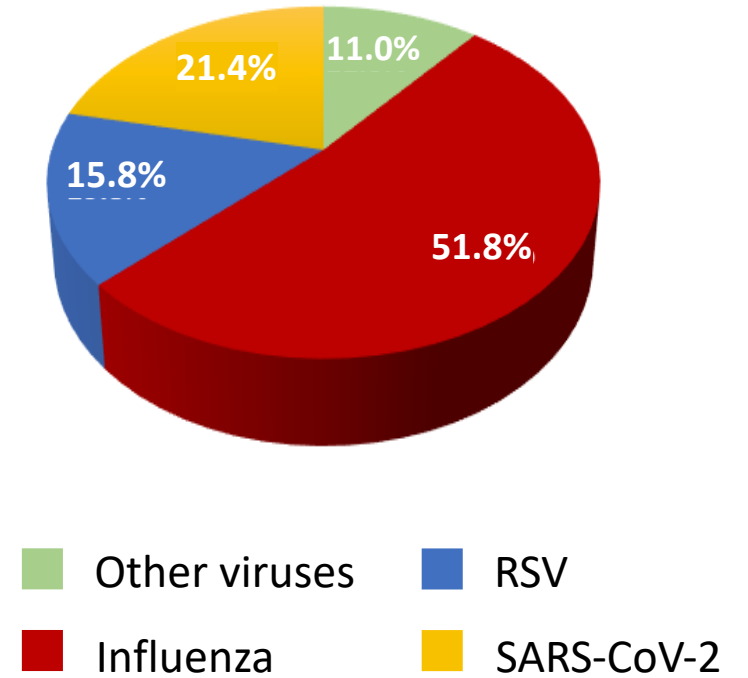
1. WHO Coronavirus (COVID-19) Dashboard. Available at <https://covid19.who.int/> Accessed 14 Aug 2023; 2. Factsheet about seasonal influenza. ECDC 12 Apr 2022. Available at <https://www.ecdc.europa.eu/en/seasonal-influenza/facts/factsheet> Accessed 14 Aug 2023; 3. Paget J, et al. *Vaccine*. 2022;40(9): 1361–1369; 4. Langer J et al. *Adv Ther*. 2023 Apr;40(4):1601-1627; 5. Intensified circulation of respiratory syncytial virus (RSV) and associated hospital burden in the EU/EEA. ECDC. 12 Dec 2022. <https://www.ecdc.europa.eu/en/publications-data/intensified-circulation-respiratory-syncytial-virus-rsv-and-associated-hospital>



Incidence of influenza symptoms (ILI) in Italy Seasons 2009/10 – 2022/23¹



65+ anni²



1. Rapporto Epidemiologico InluNet. Stagione Influenza 2022-2023. Available at www.iss.it/site/rmi/influnet Accessed Aug 9, 2023;

2. Approfondimento InluNet Virus Respiratori 2023-17. Available at <https://w3.iss.it/site/rmi/influnet/pagine/rapportoInflunet.aspx> Accessed Aug 25, 2023

Country-specific information may not be transferable to other countries.

Reasons behind the increase in incidence of respiratory viral infections



- Reduced exposure to acute respiratory viral infections other than SARS-CoV-2 over the past three years, and the subsequent loss of natural immunity against such viruses¹



- Highly transmissible SARS-CoV-2 subvariants continue to appear²



- Exposure to cold temperatures in the winter is often associated with increased incidence and severity of acute respiratory viral infections³

The consequence of the COVID-19 pandemic on other respiratory illnesses and potential future impact

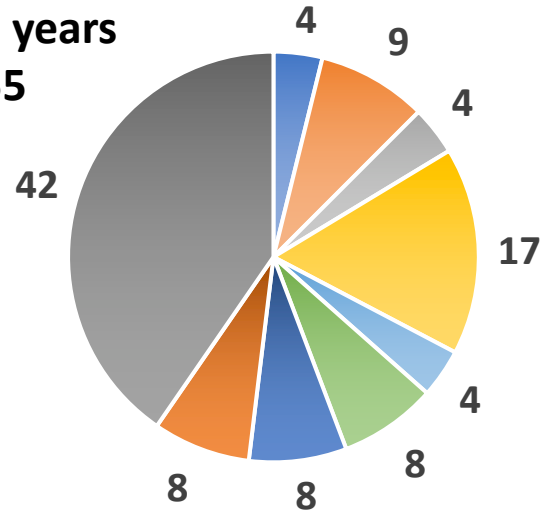
Co-infection

- Co-infection between SARS-CoV-2 and other viruses such as influenza or RSV may result in worse outcomes compared with SARS-CoV-2 only^{1,2}
- Compared with SARS-CoV-2 alone, SARS-CoV-2/influenza co-infection was associated with:
 - ▲ **Increased** risk of invasive **mechanical ventilation**^{1,2}
 - ▲ **Increased** risk of in-hospital **mortality**^{1,2}

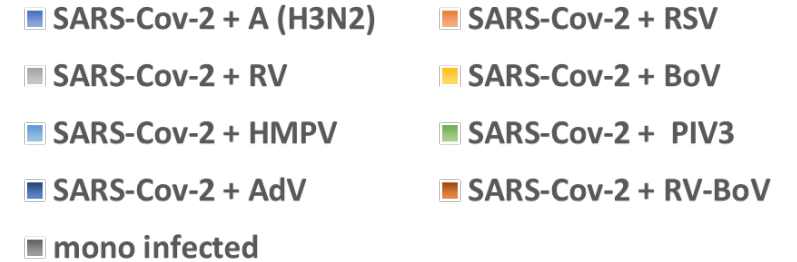
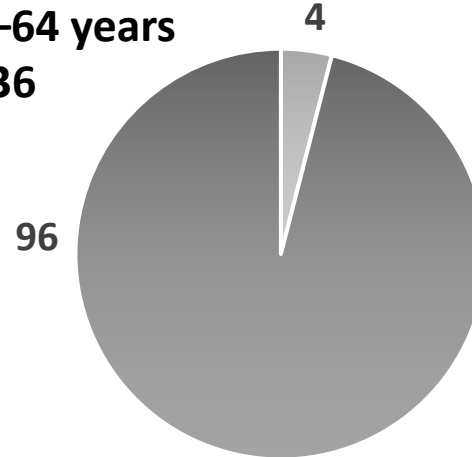
As social contact returned to pre-pandemic levels, we have seen a resurgence in influenza during winter 2022–2023 to levels higher than before the COVID-19 pandemic³

Coinfections in patients with confirmed SARS-CoV-2¹

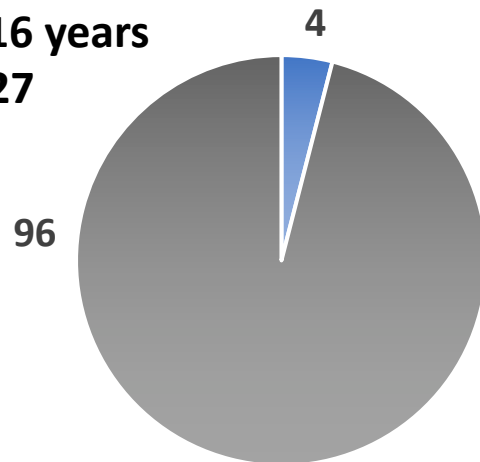
0–5 years
n=55



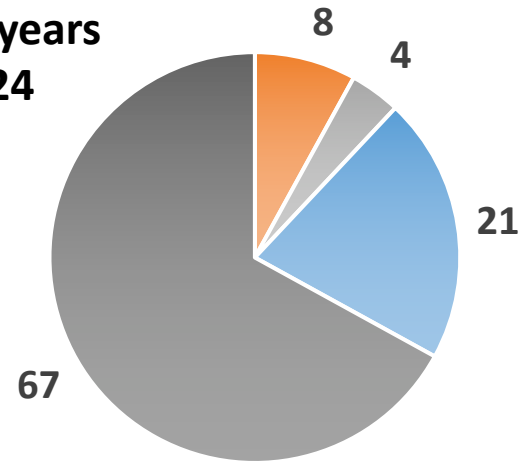
17–64 years
n=36



6–16 years
n=27



>65 years
n=124



«In patients aged >65 years, coinfection with SARS CoV-2 and other respiratory viruses, together with concomitant diseases, causes worsening of the clinical picture and complications, and can be fatal.

Screening of patients with SARS CoV-2 for other respiratory viruses is needed to select appropriate treatments and to prevent a fatal outcome of the disease»

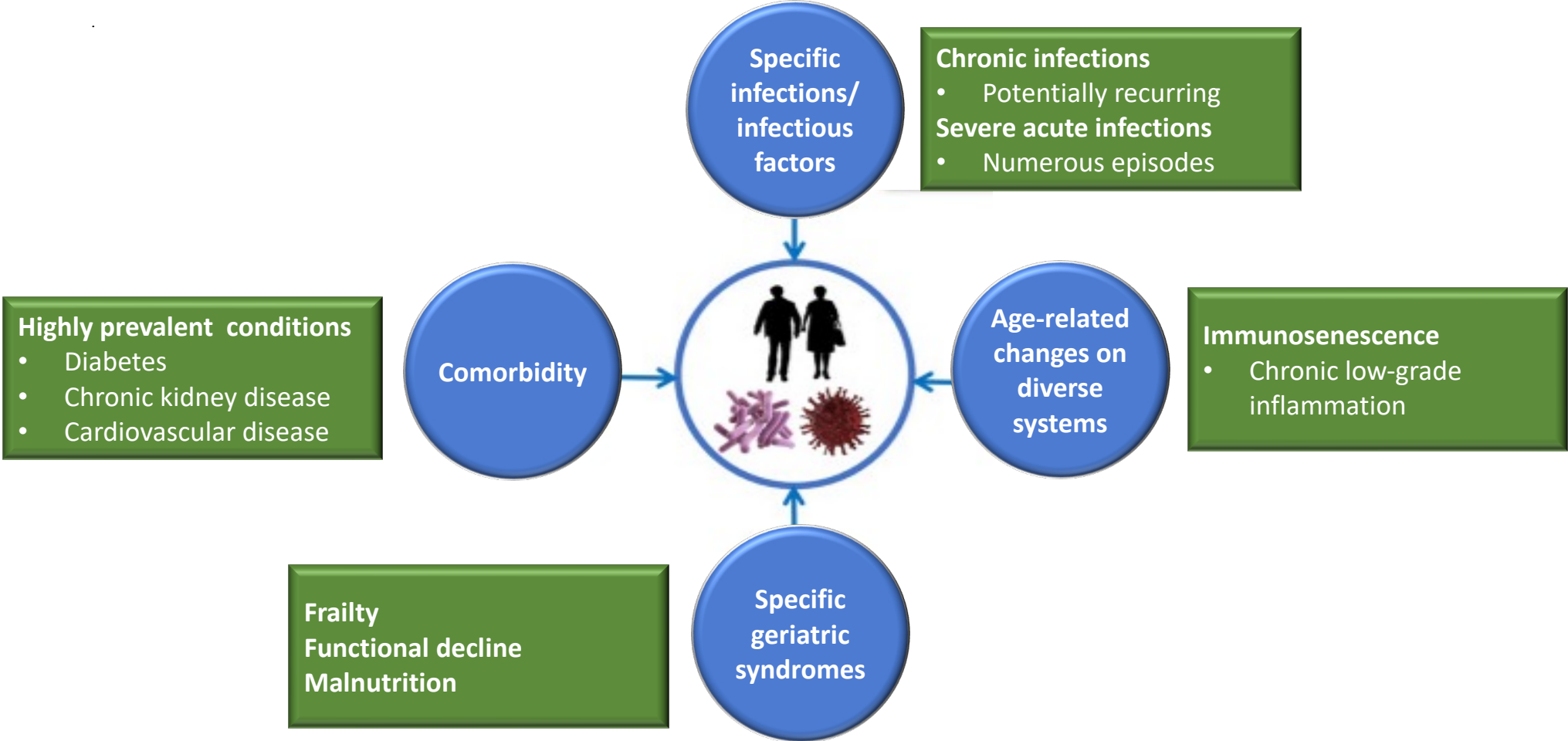
AdV, adenovirus; BoV, bocaviruses; HMPV, human metapneumovirus; PIV, parainfluenza virus; RSV, respiratory syncytial virus; RV, rhinovirus.

1. Trifonova I, et al. *Front Public Health*. 2022;10:959319.,

Outline

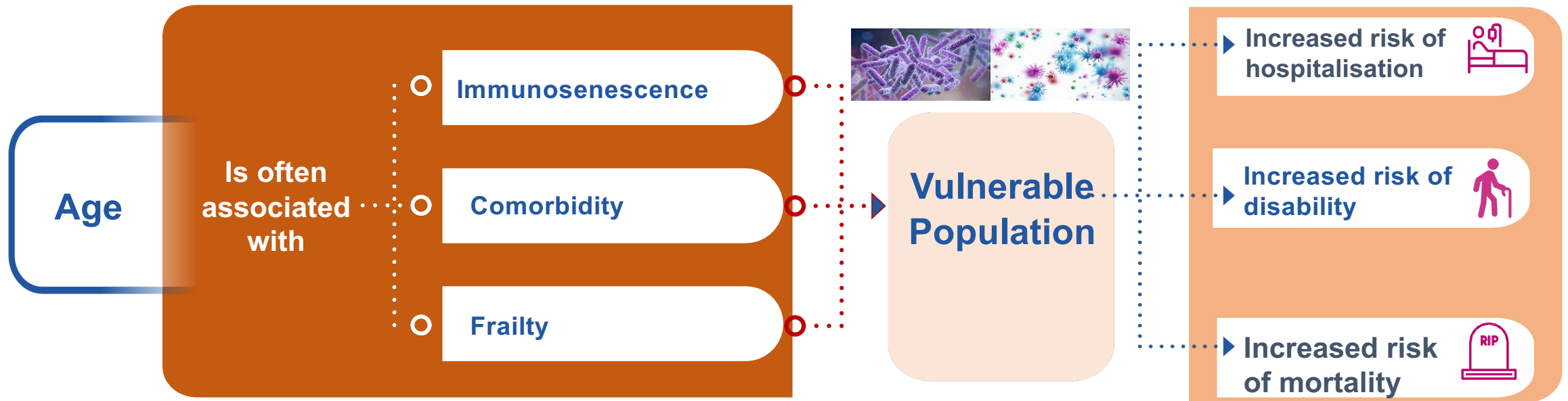
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Older adults are more susceptible to infectious diseases and to a potential decrease in vaccine efficacy¹



1. Hernandez-Ruiz V, et al. *Neurol Sci.* 2022;43:6215-6224.

Older adults are more vulnerable to infections



For all respiratory VPDs!!!!

Older patients with pre-existing medical conditions may be at risk of experiencing poor ID's outcomes

Older adults are more likely to have pre-existing medical conditions than younger individuals

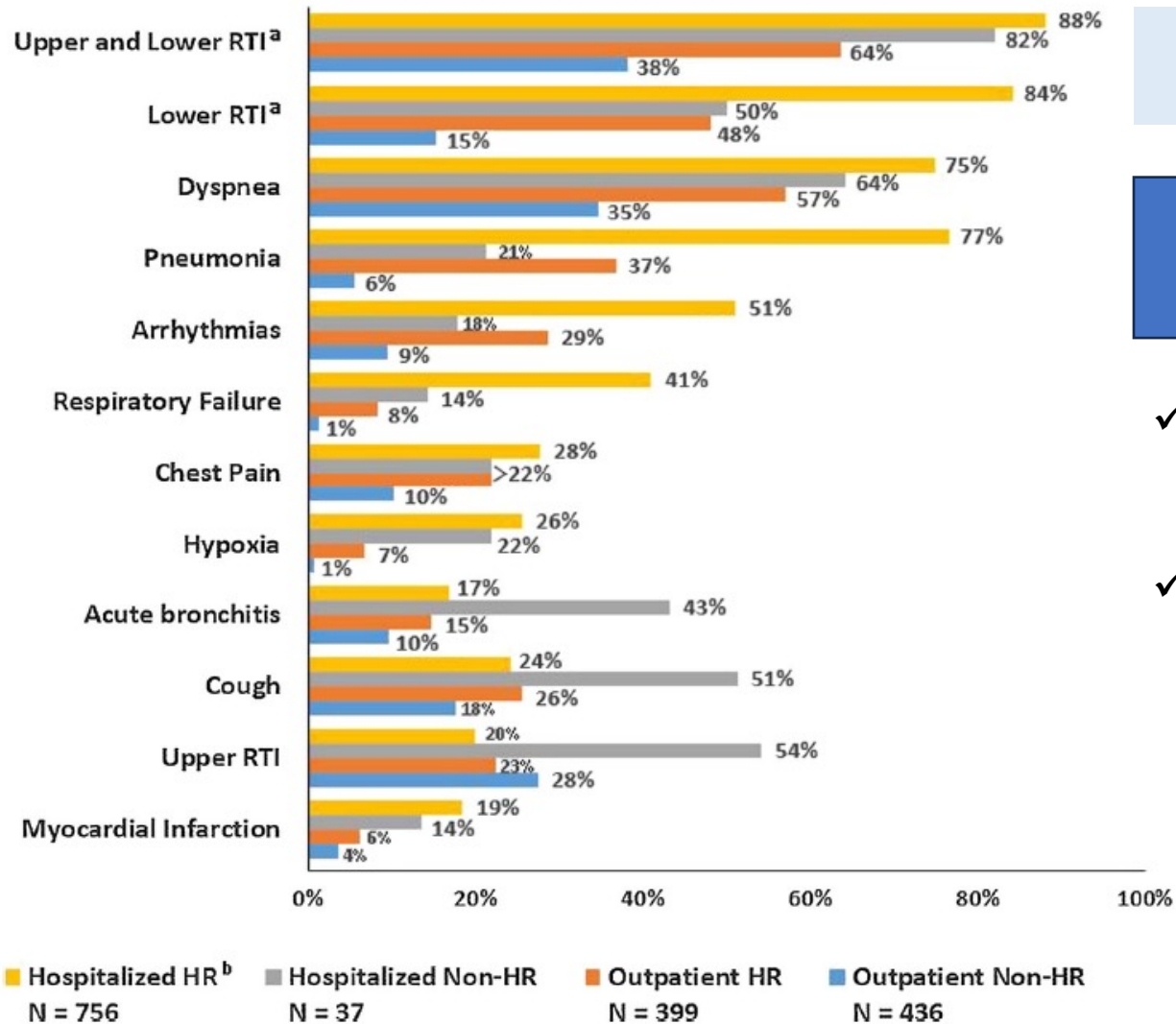
- **More** comorbidities
- **More** medications upon hospitalisation
- **Lower** prevalence of typical symptoms
- **More** frequent in-hospital complications

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Complications during follow-up period in hospitalised RSV patients¹



Real-world observational study conducted using the US Medicare database from Jan 2011 – Dec 2015

High risk patients hospitalised with RSV diagnosis (N=756)

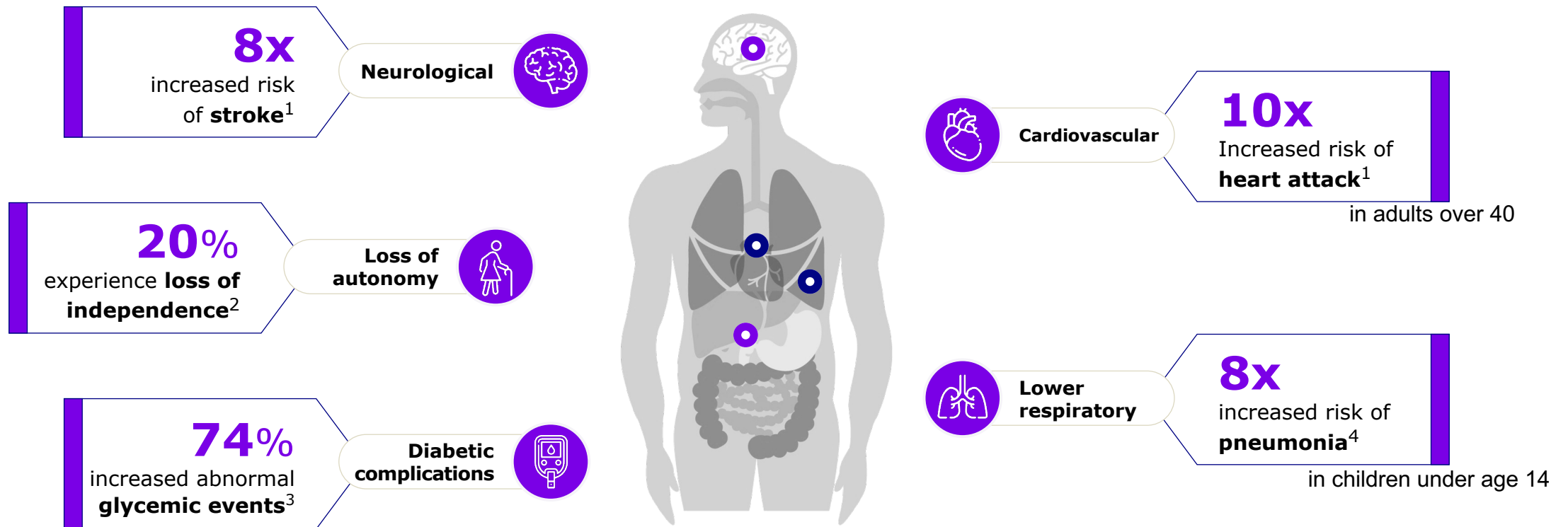
- ✓ Significant increase in healthcare utilization following hospitalisation
- ✓ Healthcare cost increased by \$9,210 per patient post-RSV diagnosis, mainly due to the higher rates of hospitalization, longer LOS due to the exacerbation of existing comorbidities

Limitations: study utilized claims data that were primarily coded for administrative purposes rather than clinical accuracy (therefore susceptible to coding errors and diagnosis discrepancies).
 LOS, length of stay; HR, high risk; RTI, respiratory tract infection.
 1. Wyffels V, et al. *Adv Ther.* 2020;37:1203-1217.

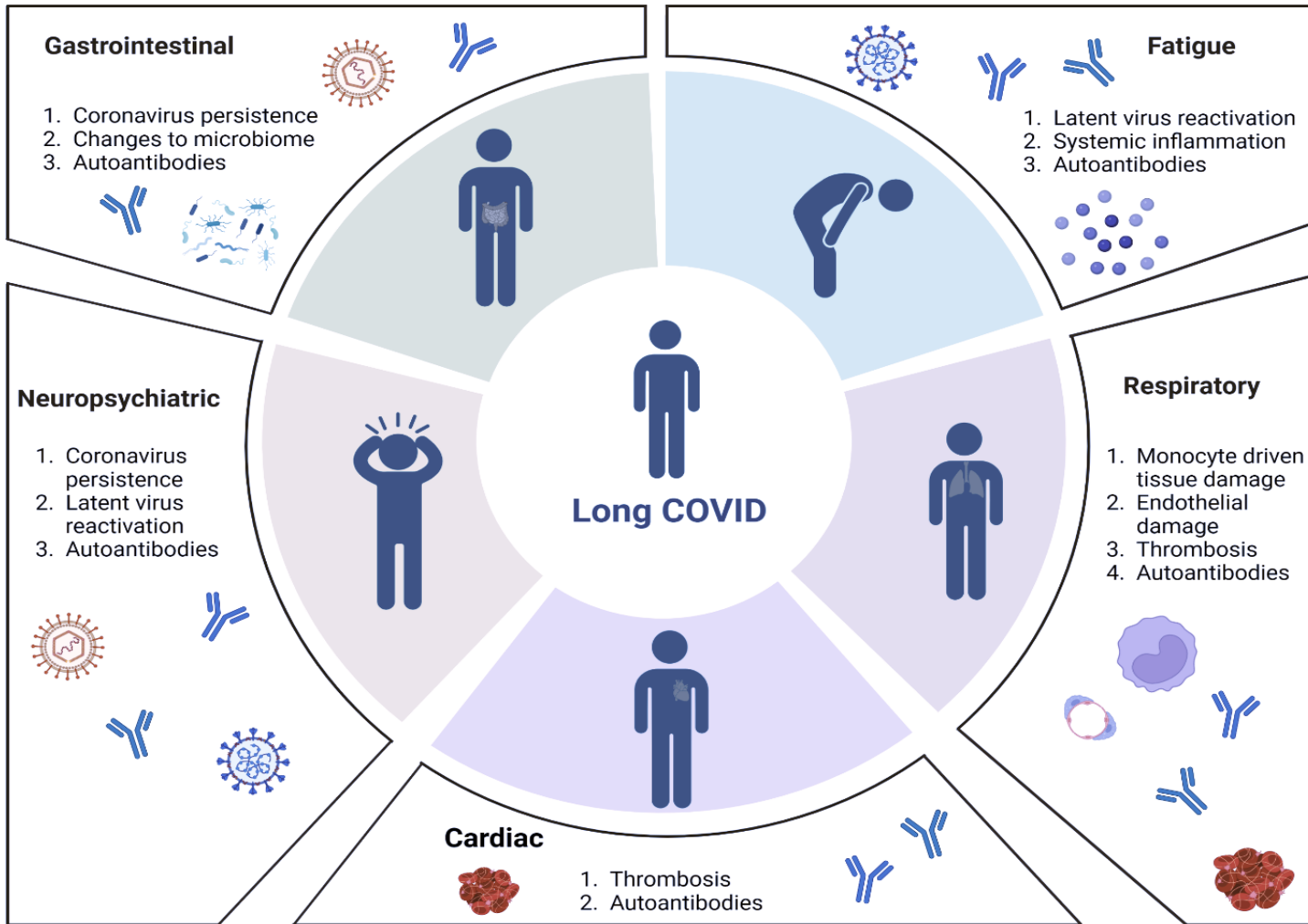
Country-specific information may not be transferable to other countries.

Influenza is associated with severe outcomes, not only limited to the respiratory system

A heavy, multidimensional impact

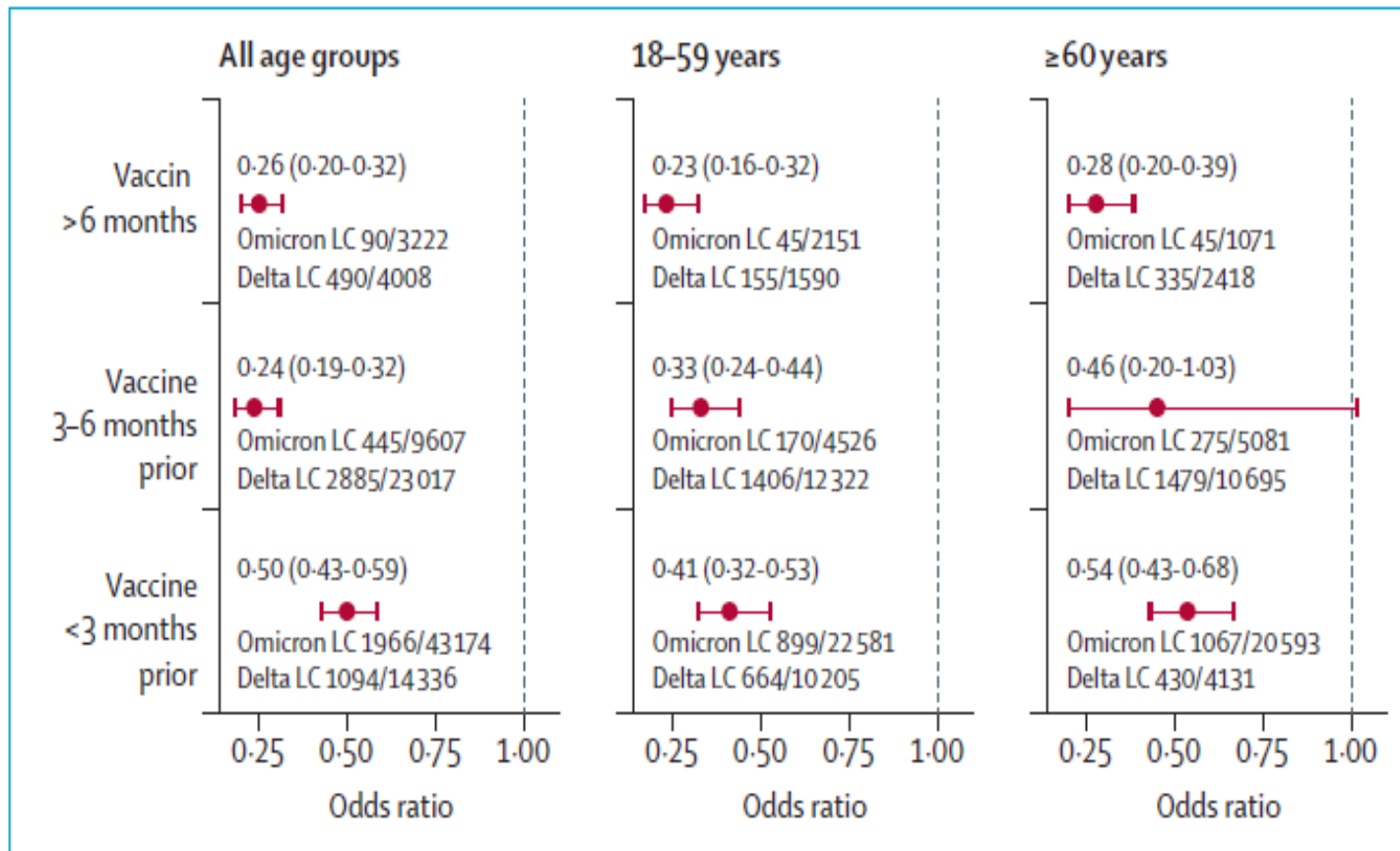


Long Covid: clues about causes¹



«...The WHO estimates that 17 million people in Europe have experienced Long COVID during the first two years of the pandemic. SARS-CoV-2 variants continue to circulate and the risk of post-acute complications remains; a recent study of 56,003 UK patients found that even after Omicron infection, 4.5% suffered persistent symptoms. It is therefore likely that Long COVID will provide a substantial medical and economic burden for the foreseeable future. There is an urgent need to understand mechanisms of disease and develop effective treatments based on this understanding»

Risk of long COVID associated with Delta versus Omicron variants of SARS-CoV-2: Relative vs absolute risk¹



Case-control observational study (self-reported data from the UK COVID Symptom Study app)

«Overall, we found a reduction in odds of long COVID with the omicron variant versus the delta variant of 0.24–0.50 depending on age and time since vaccination. However, the absolute number of people experiencing long COVID at a given time depends on the shape and amplitude of the pandemic curve. For example, given the high numbers of people infected with omicron in the UK from December, 2021, to February, 2022, our data are consistent with the UK Office for National Statistics, who estimated that the numbers of people experiencing long COVID actually increased from 1.3 million in January, 2022, to 1.7 million in March, 2022.(...)»

future numbers with long COVID will inevitably rise »

N= 56,003 UK adult Omicron cases (20 Dec 2021 – 9 March 2022)

N= 41,361 UK adult Delta cases (1 Jun 2021 – 27 Nov 2021)

Country-specific information may not be transferable to other countries.

Limitations: as these were self-reported data, there was no direct testing of infectious variants (assumed from national data) and no objective measures of illness duration.

1. Antonelli M, et al. *Lancet*. 2022;399:2263–2264.

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COVID-19 vaccines were estimated to have saved nearly 20 million lives globally in the first year of vaccination (Dec 2020–Dec 2021)¹

Global impact of the first year of COVID-19 vaccination:
a mathematical modelling study

THE LANCET

Oliver J Watson, Gregory Barnsley*, Jaspreet Toor, Alexandra B Hogan, Peter Winskill, Azra C Ghani*

“ Based on official reported COVID-19 deaths, we estimated that **vaccinations prevented... 14.4 million... deaths from COVID-19.** When considering excess death, the estimate rose to 19.8 million, representing a **global reduction of 63% in total deaths** during the first year of COVID-19 vaccination. ”

*Includes all global authorized vaccines. †Estimated using excess deaths. Estimates of excess deaths can provide information about the burden of mortality potentially related to the COVID-19 pandemic, including deaths that are directly or indirectly attributed to COVID-19.

1. Watson OJ, et al. *Lancet Infect Dis.* 2022;22:1293–1302.

COVID-19: Current challenges

- ✓ As of 10 August 2023, **70.5%** of the world population has received at least one dose of a COVID-19 vaccine¹
- ✓ Despite this, COVID-19 is predicted to be an enduring health issue²

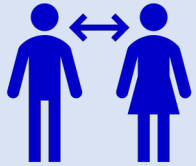
- ❖ Vaccine hesitancy and fatigue³
- ❖ Waning immunity⁴
- ❖ New variants⁴

Preventative actions

- **In Europe, ECDC and EMA advise that future vaccination campaigns in view of the upcoming cold season should prioritize people who are most at risk of contracting serious diseases.** EU national authorities take final decisions on boosters and on the type of vaccines recommended, taking into account factors such as the epidemiological situation, the impact of COVID-19 in different population groups and the emergence of new variants
- **Non-pharmaceutical interventions²**

Non-pharmacological interventions...some have collateral effects for older adults^{1,2}

Non-pharmacological interventions of the COVID-19 pandemic



Physical distancing



Mask wearing



Ban on mass gatherings



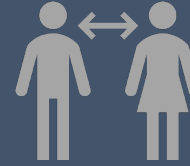
Orders to stay-at-home



Travel restrictions

Now

The ongoing impact for older adults



Social isolation and withdrawal



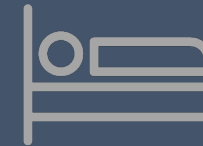
Continued fear of SARS-CoV-2



Difficulty accessing services



Poor physical and mental health



Reduced hospital/care home visitation

RSV vaccines for adults ≥ 60 years approved in 2023



In May 2023, the FDA approved two RSV vaccines for adults ≥ 60 years: GSK3844766A¹ and RSVpreF (PF-06928316)²



On June 21, 2023, the Advisory Committee on Immunization Practices recommended that persons aged ≥ 60 years may receive a single dose of RSV vaccine, using shared clinical decision-making³



July 2023, EMA approved RSVpreF (PF-06928316) for adults ≥ 60 years⁴

Raising awareness about RSV will be key to educating the public and healthcare professionals on the importance of vaccination campaigns⁵

1. Available at: <https://www.gsk.com/en-gb/media/press-releases/us-fda-approves-gsk-s-arexvy-the-world-s-first-respiratory-syncytial-virus-rsv-vaccine-for-older-adults/>. Accessed Aug 31, 2023;

2. Available at: <https://www.pfizer.com/news/press-release/press-release-detail/us-fda-approves-abrysvo-tm-pfizers-vaccine-prevention>. Accessed Aug 31, 2023;

3. Melgar M, et al. MMWR Morb Mortal Wkly Rep. 2023;72(29):793–801. 4. EMA News 21 July 2023. Available at <https://www.ema.europa.eu/en/news/first-rsv-vaccine-protect-infants-6-months-age-older-adults>.

Accessed Aug 30, 2023; 5. Increasing awareness of RSV vaccines. AJMC May 30, 2023. Available at <https://www.ajmc.com/view/increasing-awareness-of-rsv-vaccines>. Accessed Aug 30, 2023.

	Weeks	Months		Years																							
	6	6	7-23	2	4	5	6	7	12	13	15	16	17	18	45	54	55	59	60	64	≥ 65						
Austria			IIV ¹										IIV ²														
Belgium		IIV ⁴ ³										IIV ⁴ ⁴															
Bulgaria																						IIV ⁵					
Croatia		IIV ⁴ ⁶										IIV ⁴ ⁷															
Cyprus		IIV ³ ⁸	IIV ³ ⁸										IIV ³ ⁹														
Czech Republic		IIV ⁴ ¹⁰										IIV ⁴ ¹¹															
Denmark																						IIV ⁴ ¹²					
Estonia		IIV										IIV															
Finland		IIV/LAIV ¹³										IIV ⁴															
France			LAIV										IIV ⁴														
Germany																						IIV ⁴ ¹⁴					
Greece		IIV ³										IIV ³															
Hungary																						IIV ³					
Iceland																						IIV ⁴ ¹⁵					
Ireland			IIV ⁴ /LAIV ¹⁶										IIV ⁴ ¹⁷														
Italy		IIV ³ ¹⁹										IIV ³															
Latvia		IIV ⁴	IIV ⁴ /LAIV ²⁰										IIV														
Liechtenstein																						IIV ³ ²¹					
Lithuania																						IIV ³ ²²					
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Norway		IIV ⁴ ²⁵										IIV ⁴															
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Spain		IIV ²⁸					IIV ²⁹										IIV ⁴ ⁴										
Sweden		IIV ³ ³⁰										IIV ³															

Seasonal influenza vaccination strategies in the EU/EEA¹

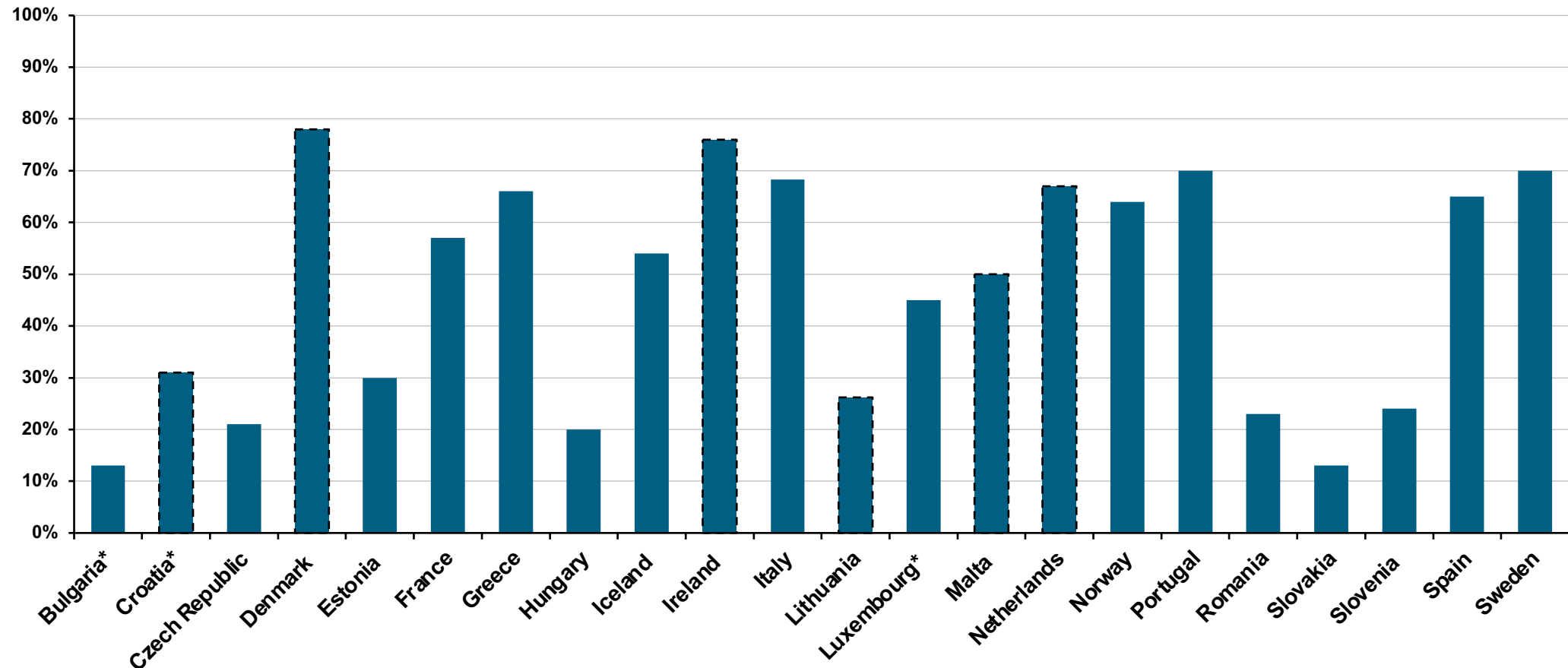
ECDC review indicated strong evidence for immunising two large risk groups (to prevent severe disease):²

- **Older adults**
- All persons (over six months of age) with chronic medical conditions

Many countries use the age of 65 years as a threshold

1. Influenza: Recommended vaccinations. Available at: <https://vaccine-schedule.ecdc.europa.eu/Scheduler/ByDisease?SelectedDiseaseId=15&SelectCountryIdByDisease=-1>. Accessed 31 Aug 2023; 2. Risk groups for severe influenza. Available at: <https://www.ecdc.europa.eu/en/seasonal-influenza/prevention-and-control/vaccines/risk-groups>. Accessed 31 Aug 2023

Influenza vaccination coverage rates across EU/EEA countries in elderly individuals (2021–2022)



*Data for 2020–2021

1. WHO. Influenza vaccination coverage. Available at: https://immunizationdata.who.int/pages/coverage/flu.html?CODE=&ANTIGEN=FLU_ELDERLY&YEAR=&ADVANCED_GROUPINGS=EURO.

Accessed 31 Aug 2023.

Vaccine co-administration as an approach to mitigate the impact of respiratory viral diseases

HUMAN VACCINES & IMMUNOTHERAPEUTICS
2023, VOL. 19, NO. 1, 2195786
<https://doi.org/10.1080/21645515.2023.2195786>



COMMENTARY

OPEN ACCESS

Vaccine co-administration in adults: An effective way to improve vaccination coverage

Paolo Bonanni^{a*}, Robert Steffen^{b,c*}, Jörg Schelling^d, Lina Balaisyte-Jazone^{e#}, Inga Posiuniene^e, Maciej Zatoński^{f,g}, and Pierre Van Damme^h

“ Healthcare providers could more often recommend and practice vaccine co-administration; this would not risk patient safety and health, would improve protection against vaccine-preventable diseases, and would help comply with national vaccination calendars. ”

Conclusions

Ongoing challenges in older adults include risk of severe disease in the most vulnerable individuals, long-COVID, and co-infections

Relaxation of non-pharmaceutical interventions in conjunction with continued evolution of SARS-CoV-2 viruses will maintain the risk of COVID-19 and increase the risk posed by other respiratory infections which preferentially impact older adults

Older adults and high-risk individuals should receive COVID-19 boosters and vaccines for other VPDs according to national recommendations, possibly in co-administration, to optimize the vaccine coverage