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Surveillance of severe influenza and COVID-19 in Sweden

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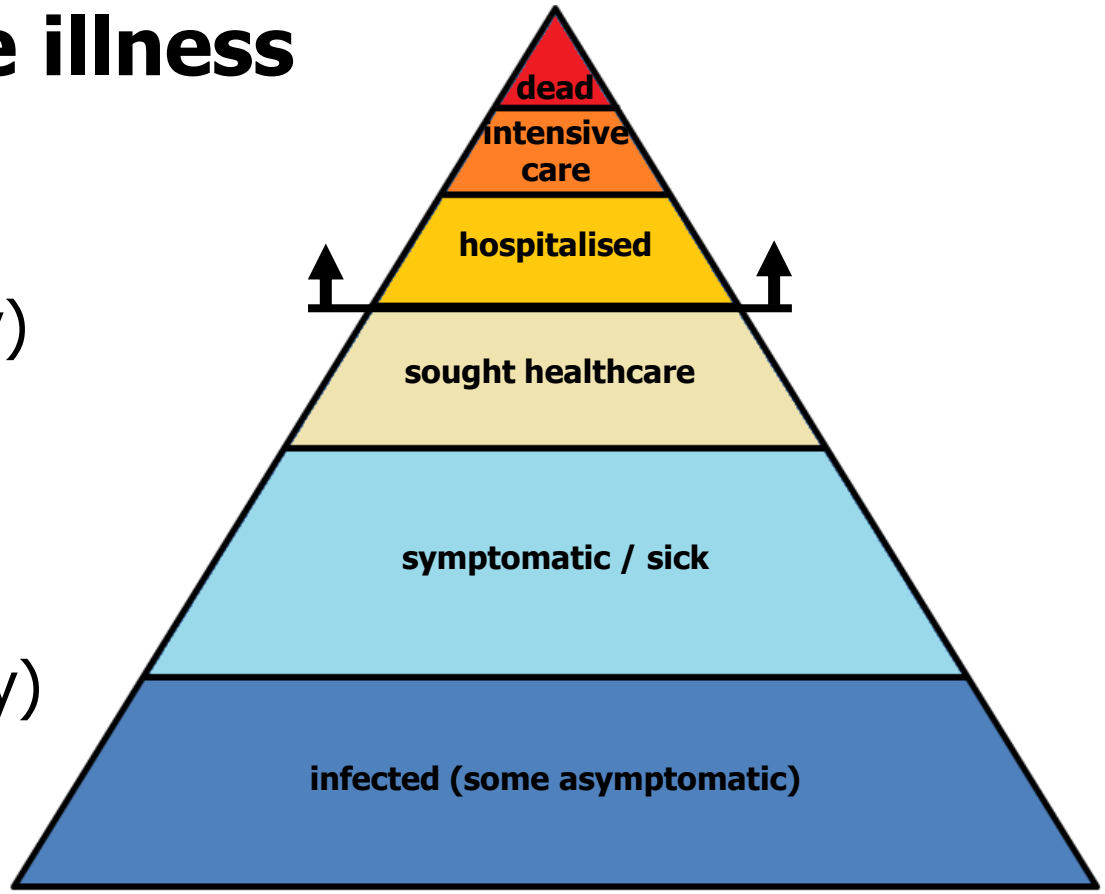
Surveillance sources for severe illness

- Hospital/intensive care bed occupancy
- Hospital admissions (with significant delay)
- Intensive care admissions
- Deceased laboratory-confirmed cases
- Cause of death data (with significant delay)
- Excess mortality modelling
- Virus characterisation and sequencing, including antiviral resistance monitoring, monitoring of genetic groups



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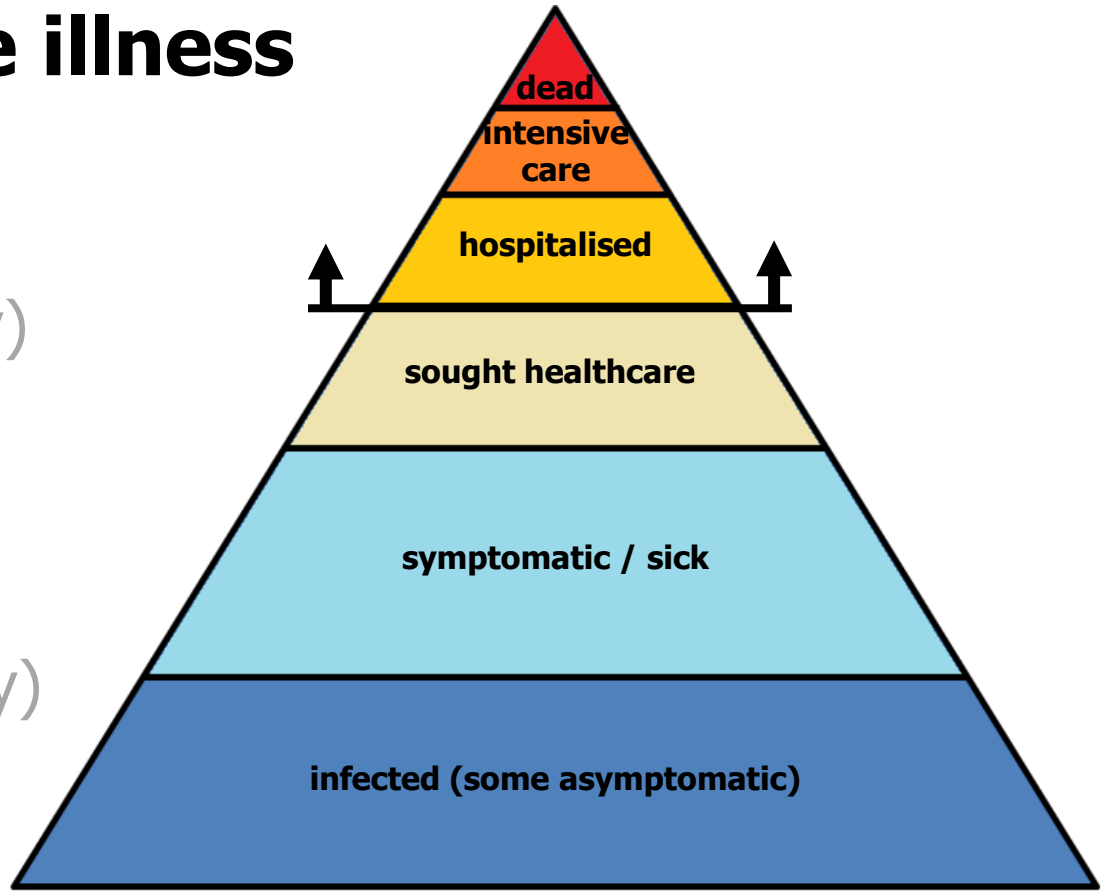

Surveillance of intensive care admissions

- All patients admitted to intensive care with laboratory-confirmed influenza or COVID-19
  - Combined with mandatory notifications from laboratories
- Developed during the 2009 influenza pandemic
- Nearly universal coverage, ca 10 million population
- Data from the Swedish Intensive Care Registry added once care ends
  - https://www.icuregswe.org/en/
- Year-round surveillance

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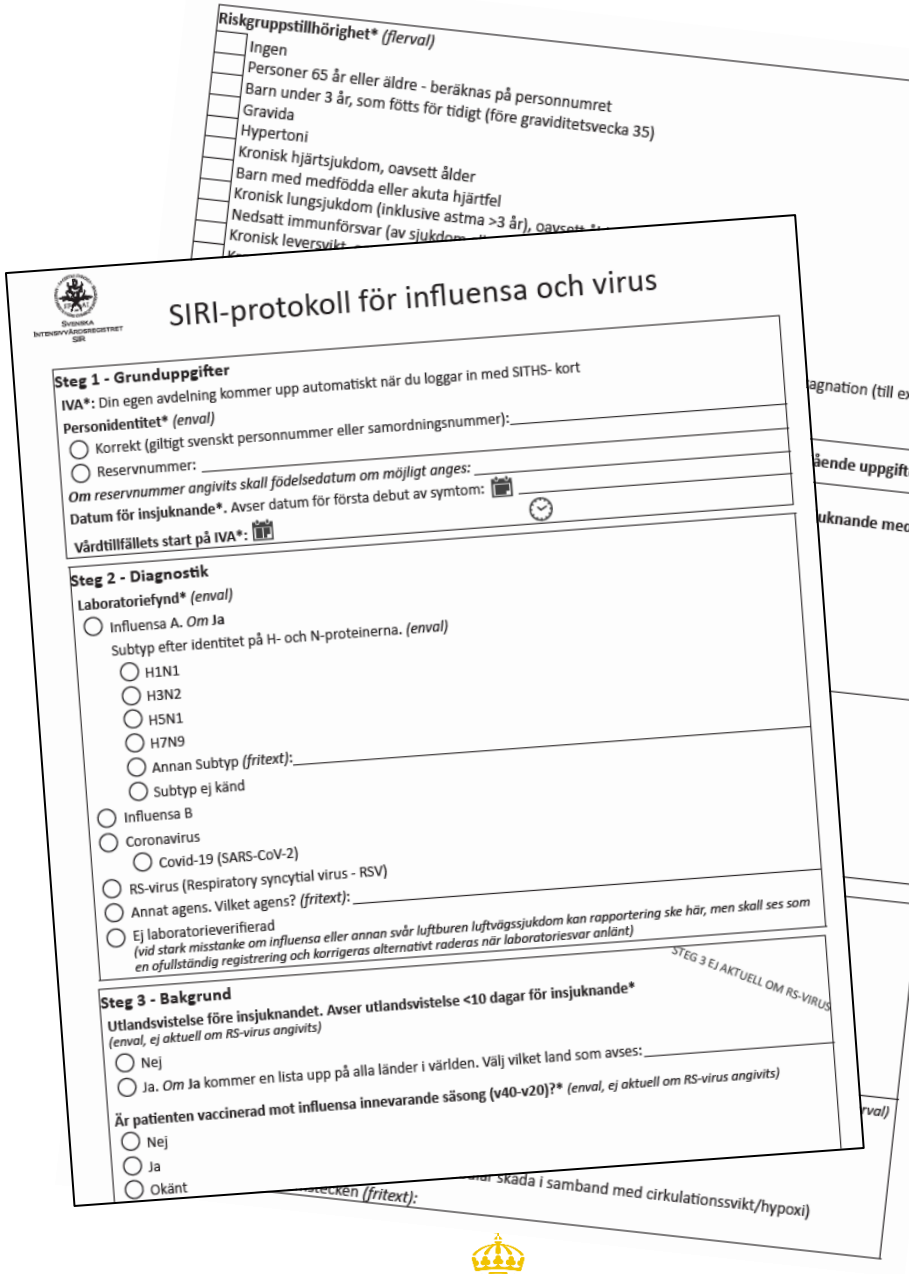
Variables collected upon intake

- Virus and subtype (if available)
- Travel abroad
- Risk group status
- Vaccination status
- Antiviral treatment
- Secondary bacterial infections
- Unusual symptoms (e.g. CNS or heart symptoms)



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Variables added from the Swedish Intensive Care Registry

- Length of stay
- Interventions in intensive care (ECMO*, mechanical ventilation, etc.)
- Primary diagnosis, secondary diagnoses
- Status at end of intensive care (died, moved to other ward, discharged)

*ECMO = extracorporeal membrane oxygenation

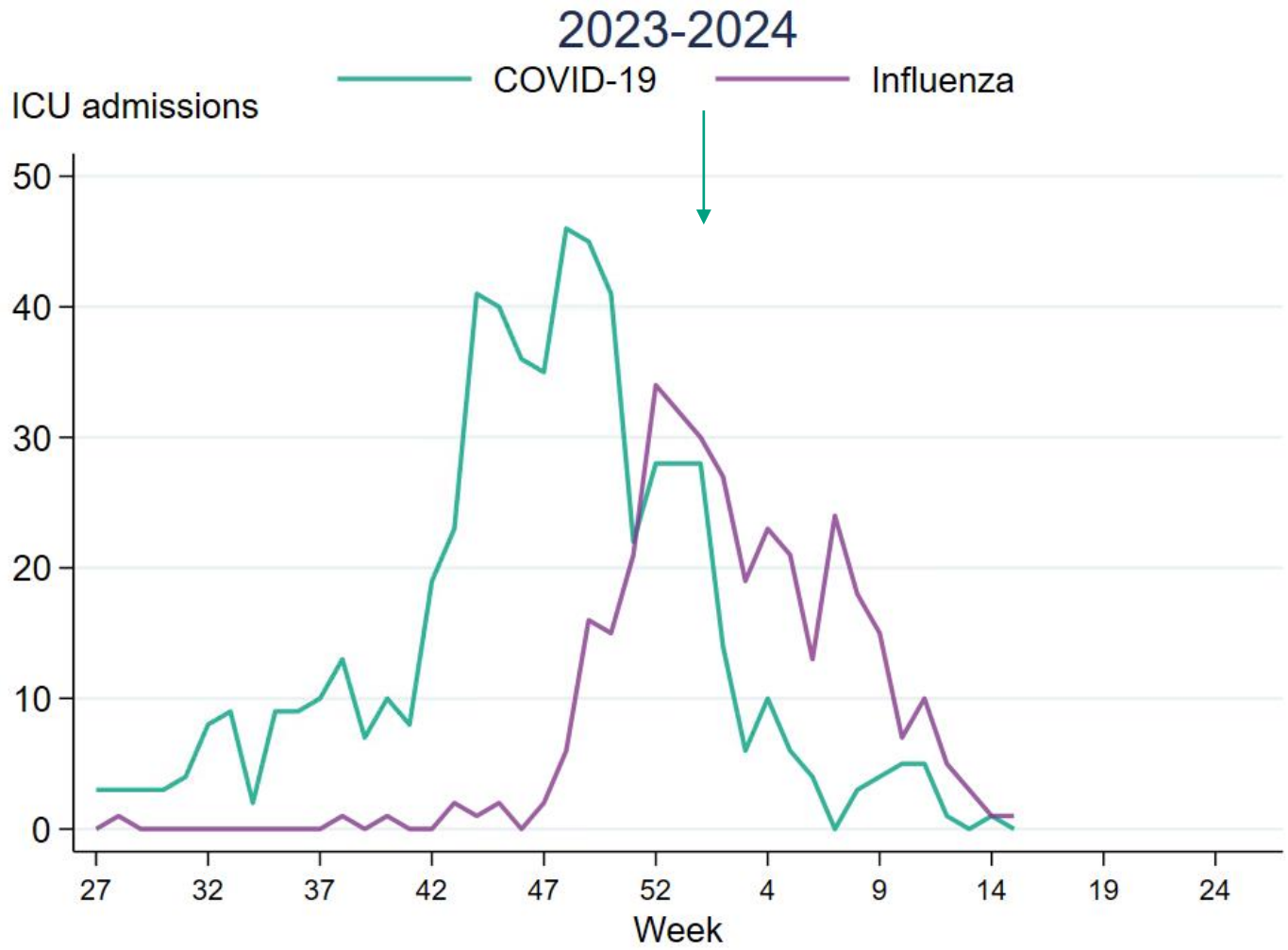
The 2023-2024 season in Sweden

Influenza (94 % flu A)

- 80 % of subtyped samples A(H1)pdm09
- Median age 61 years
  - 41 percent ≥65 years
- Peak week 52 (n=36)

COVID-19

- Median age 71 years
  - 68 percent ≥65 years
- Peak week 49 (n=53)



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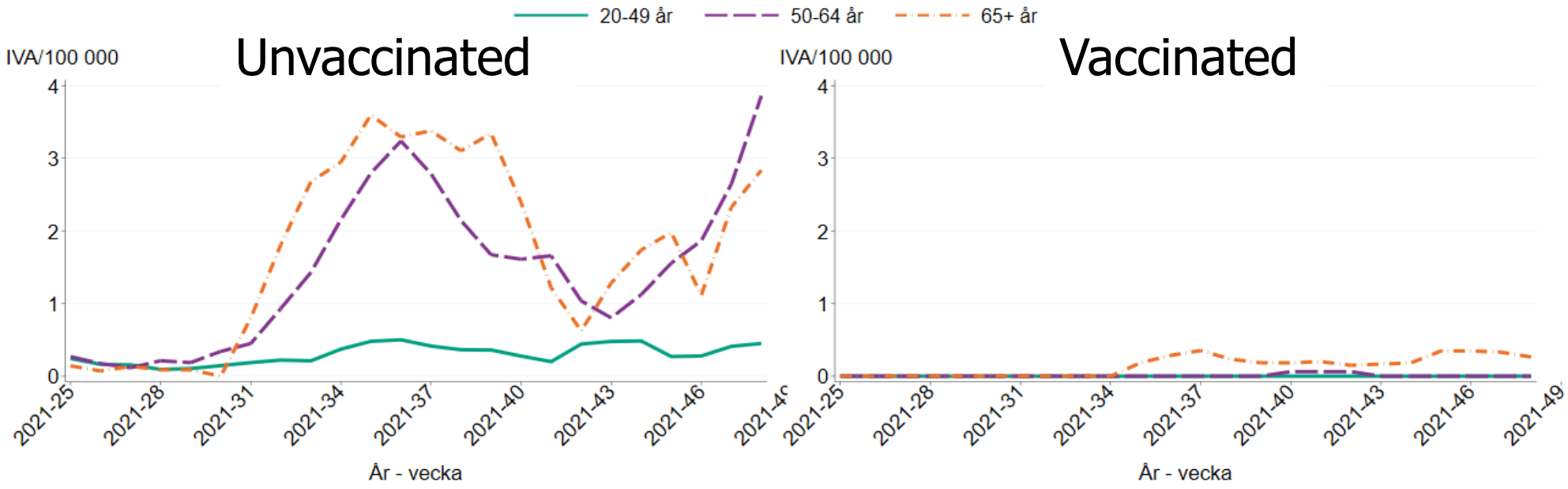
COVID-19 intensive care incidence by week and vaccination status, 2021

- Three-week moving average of ICU admissions with COVID-19 per week (weeks 25-47, 2021)

Legend

green solid: 20-49 yrs
purple dashed: 50-64 yrs
orange dot-dashed: ≥65 yrs



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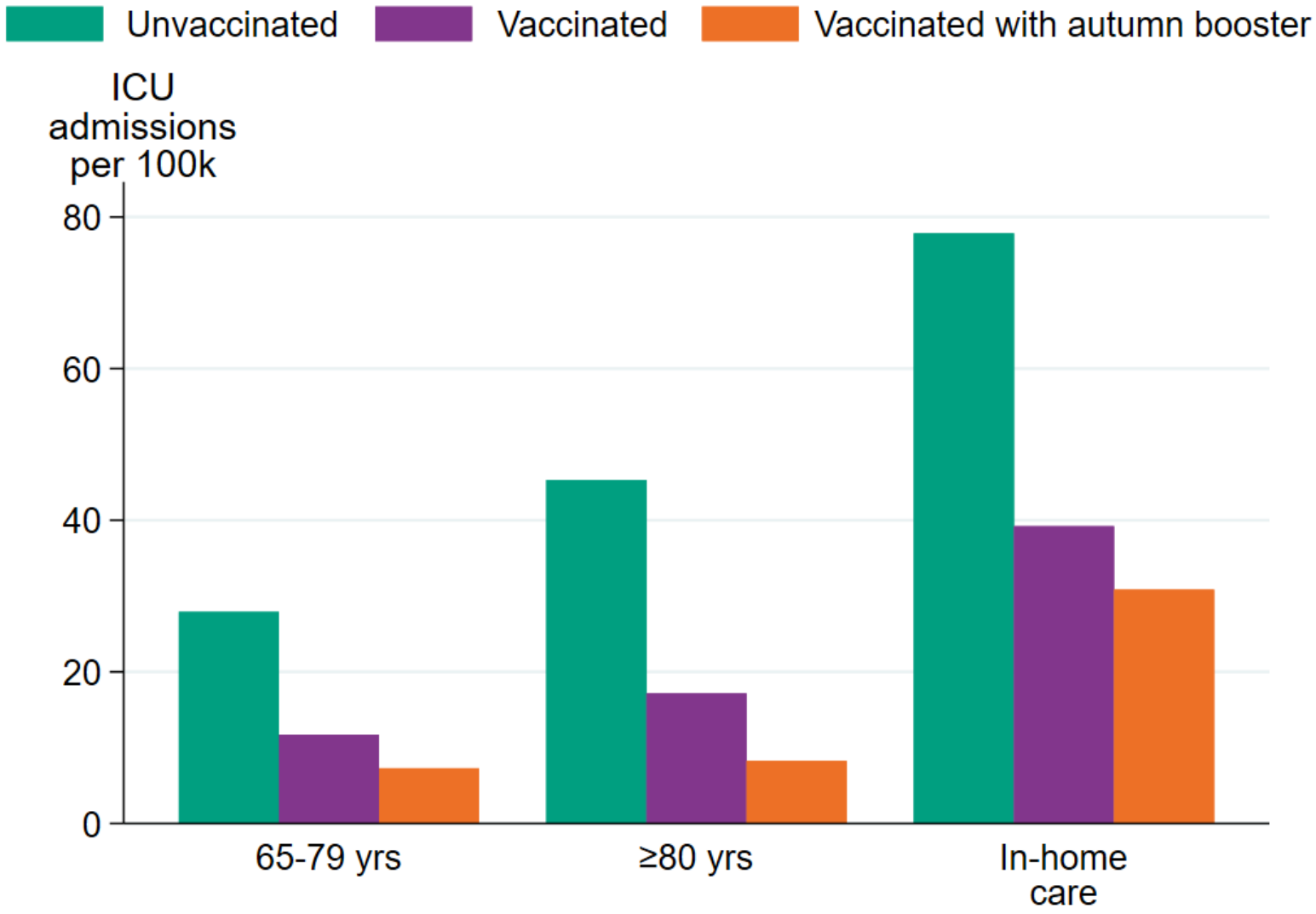
COVID-19 intensive care rates

week 47 2022 – week 2 2023



Legend (left to right)

green: unvaccinated
purple: vaccinated
orange: autumn booster

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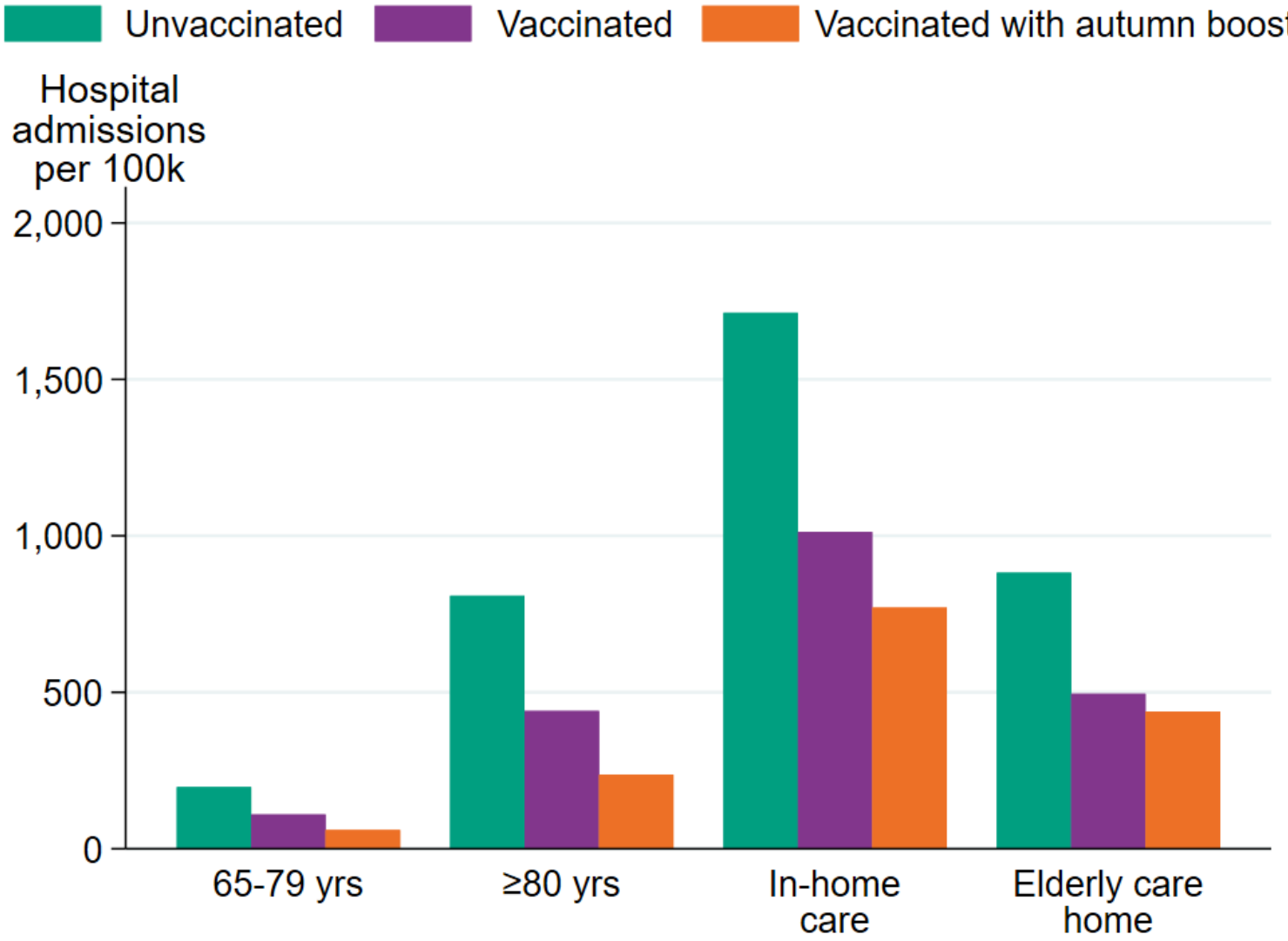
COVID-19 hospitalisation rates

week 47 2022 – week 2 2023



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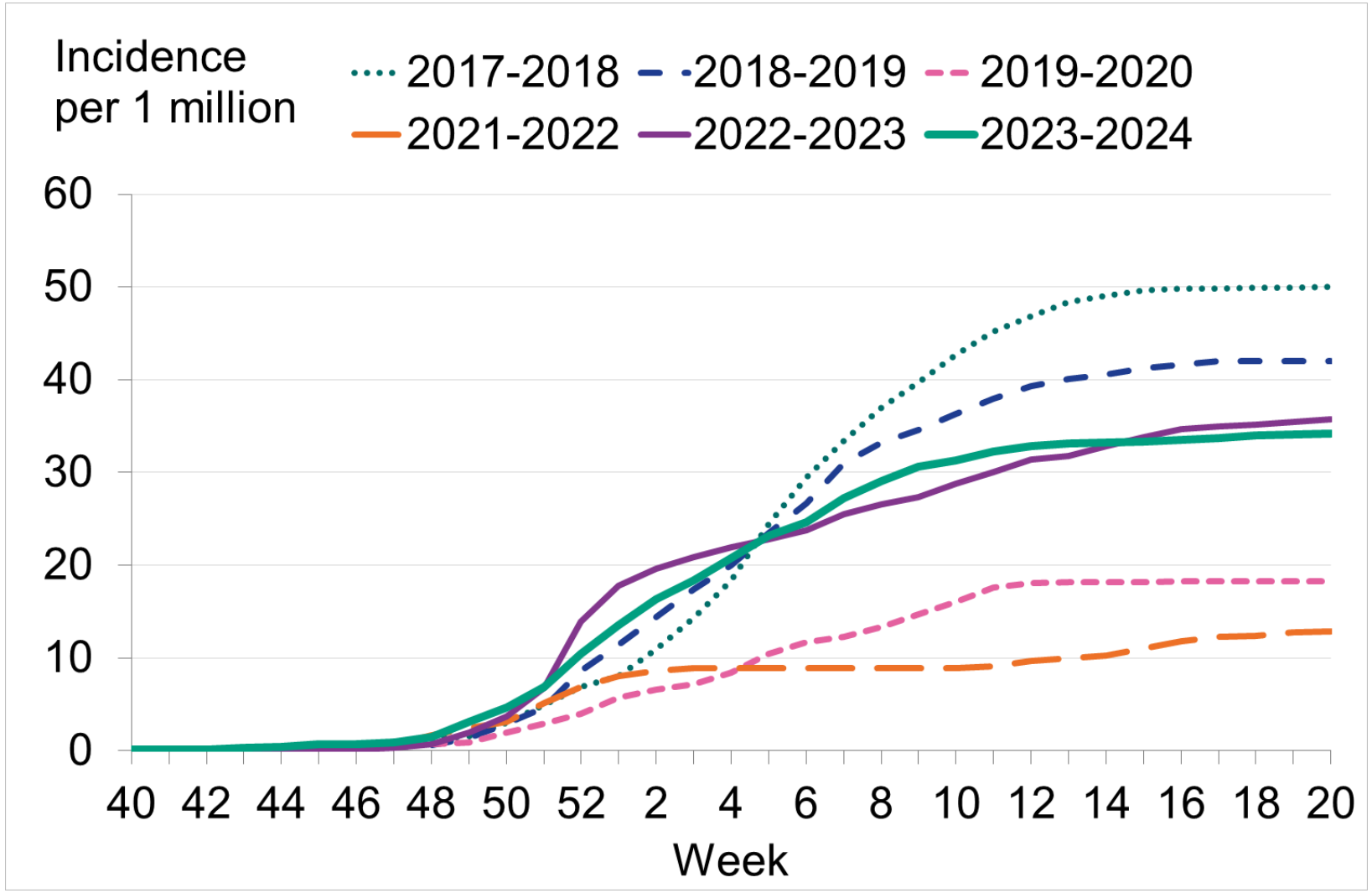
Cumulative incidence of ICU admissions for influenza, per week and season



Dominant types

2017-18: B/Yam

2018-19: A/H1

2022-23: mixed season
2023-24: A/H1 and A/H3

2019-20: mixed season
2021-22: A/H3

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Challenges and successes

Successes

- Continuous data availability, most reported within one week
- Only highest level of care
  - Manual entry feasible
- National coverage (-ish)
- Flexible system, easy to add new pathogens
- In routine use

Challenges

- Manual data entry
  - Delays longer in lower priority periods
- Only highest level of care
  - Does not give earliest warning
- Not all patient samples are subtyped or sent for further virological analysis
- New pathogens require prioritisation
- Some data comes from patient recall (flu vaccination)

Lessons learned and future plans

- Systems in routine use before a pandemic, work during a pandemic
- National vaccination registry important for evaluation of interventions
- Systems requiring manual data entry should focus on most prioritised pathogens, at a feasible level of care
- Integration of surveillance of COVID-19, influenza and RSV continues throughout all levels of disease severity
- Evaluation and further development, identification of gaps and overlaps
- Preparedness for the next pandemic

Thank you!

Foto: Elliot Elliot/Johnér

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