European forecast hub: 22 June 2021

- Sweden data issue
  - No published data since 15 June
  - Reporting from 17 June: data published "in the next few days"
  - Forecasts removed from evaluation until data updated

- Forecast values now integers
  - Thanks for smooth change in submissions this week
  - Updating all previous forecasts to integers over the next week

European hospitalisation data
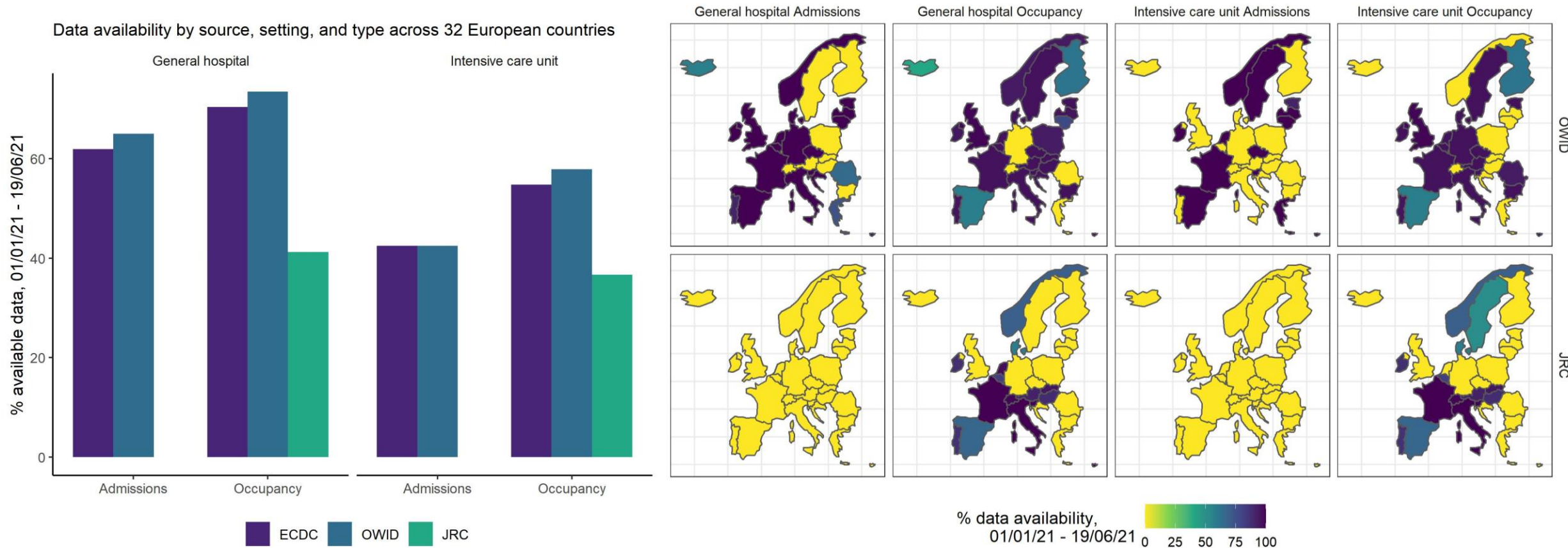
Public data sources

1. **European Centre for Disease Control** (ECDC)
   - Aggregates national datasets
   - Adds TESSy – EU reporting system
   - Published weekly with lag
2. **Our World in Data** (OWID)
   - ECDC data + United Kingdom
3. **Joint Research Centre** (JRC), European Commission
   - Aggregates national datasets
   - Published daily

Healthcare data

- Healthcare settings
  - **General hospital** patients
  - **Intensive care unit** (ICU) patients
- **Admissions**
  - New patients admitted
  - Only published by ECDC
- **Occupancy**
  - Total occupied beds
  - Published by ECDC and JRC

Data availability over 2021

- All sources have some missing data by location and date
- One hub location not covered at all (Lichtenstein)
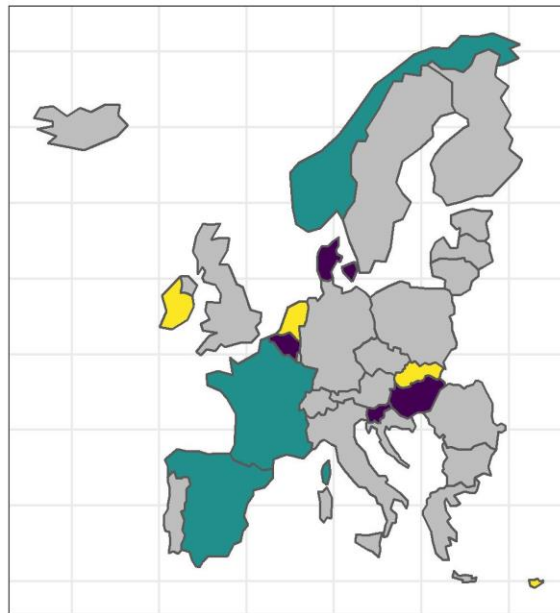- Several rarely covered (Iceland, Finland, Switzerland)

- Counts of occupancy data (hospital and ICU) can vary
- JRC and ECDC reported different data for the same date in 12 locations in 2021
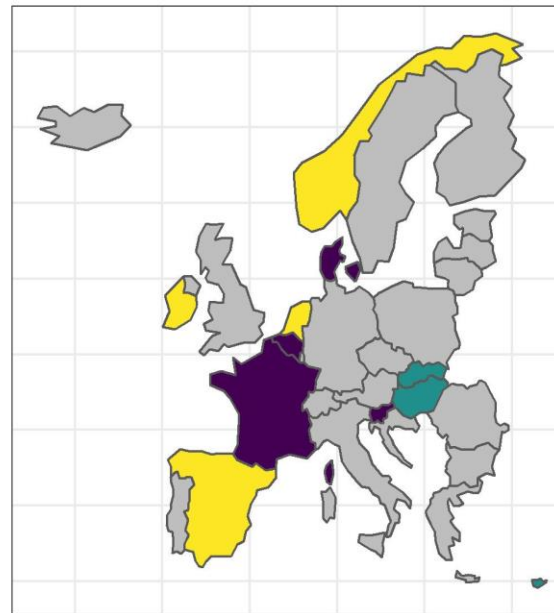- JRC less likely to be updated after missing data or data reporting effects

Daily hospital occupancy

% dates with differing counts

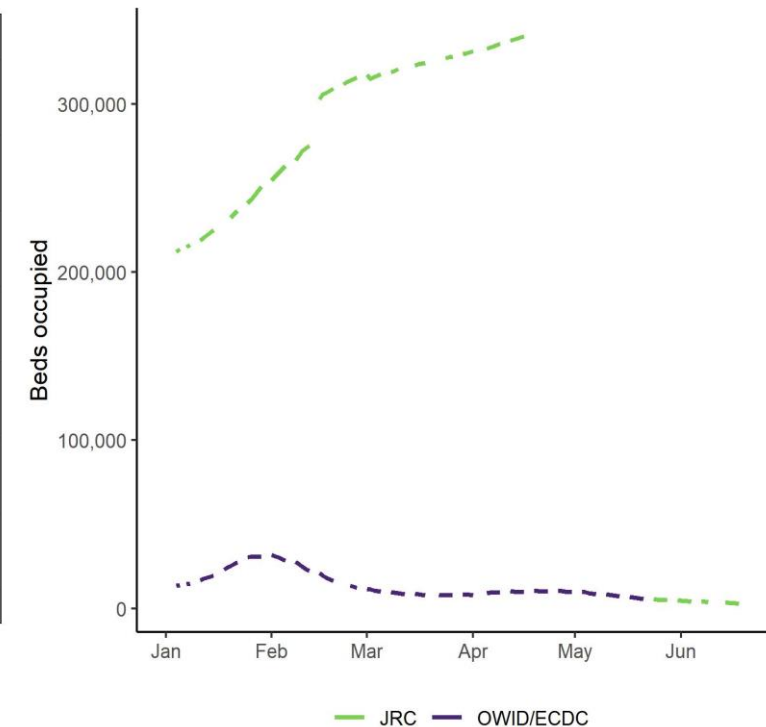Median difference in count

Spain, general hospital bed occupancy

1<25%   >25%   >75%   NA

1<50   50<2,000   >2,000   NA

JRC - ECDC data (OWID count conversion),
01/01/21 - 19/06/21

JRC — OWID/ECDC

Hub decisions:
Adapting for healthcare targets

- All other hub targets are weekly sums of daily counts of incidence
- Healthcare data do not fit this pattern:

New admissions

Raw data (ECDC):

- Incidence rate per 100,000
- OWID convert to count

Options:

- Forecast the rate
- Use OWID conversion

Beds occupied

Raw data:

- Count of prevalence

Options:

- Forecast weekly mean occupancy
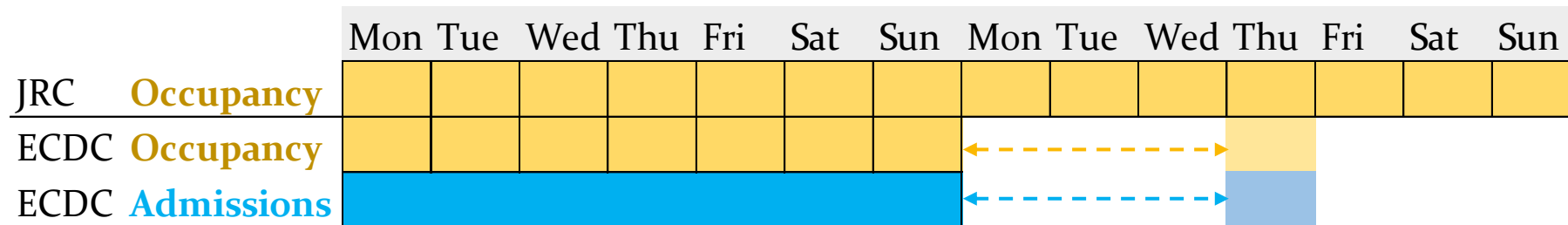- Forecast end of week occupancy

Forecasting vs. data publication timeline

ECDC/OWID

- Data: occupancy & admissions
- Collected: **Monday – Sunday**
- Published: **following Thursday**

JRC

- Data: occupancy only
- Collected: **daily**
- Published: **following day**

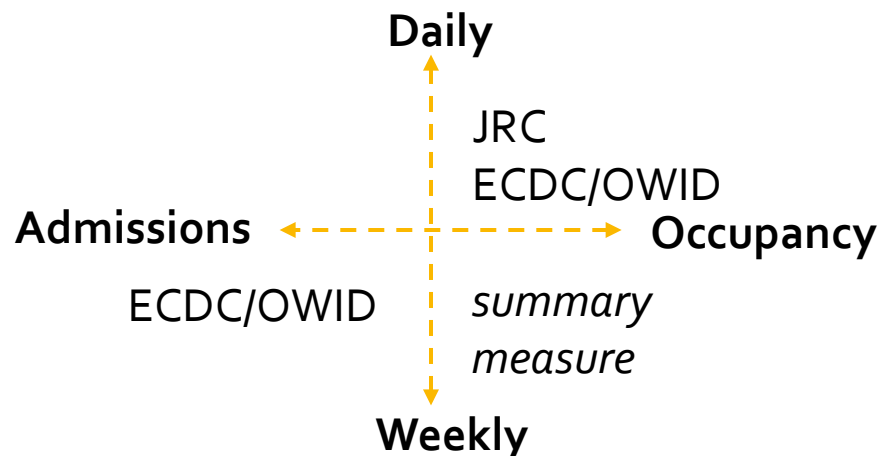|		Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun
JRC	Occupancy														
ECDC	Occupancy														
ECDC	Admissions														

Implications for forecasting

- Most recent 4-10 days: missing in ECDC/OWID data, present in JRC data
- ECDC/OWID data = forecasting from 2 weeks ahead from last data publication
- Admissions: week definitions Monday-Sunday, with Sunday target end date

JRC

- Need a weekly summary measure for occupancy

- Data are daily, so weeks would match current hub definition (Sun-Sat)

- Higher % missing across locations
- No admissions data

ECDC/OWID

- More complete across locations/dates; OWID adds UK

- Occupancy data continuously lags JRC data by 4-10 days

- Forecasting 2 weeks ahead from data to match the hub 1 week ahead target end date

- Weeks defined Mon-Sun; target end date (week end) = Sunday

Daily

JRC
ECDC/OWID

Admissions ← — — — — → **Occupancy**

ECDC/OWID   *summary measure*

Weekly

New forecast target

	Recommendation	Rationale
Truth data	OWID	• Converts ECDC data to count • Includes UK data
Target setting	General hospital	• Most reliable data availability
Target count	Admissions	• Avoids lag between occupancy data sources • Matches other hub targets for incidence

Issues

• Horizon: should 6 days after forecast date be 2 week ahead horizon?

• Target end date validation: change to Sundays

Extra detail:
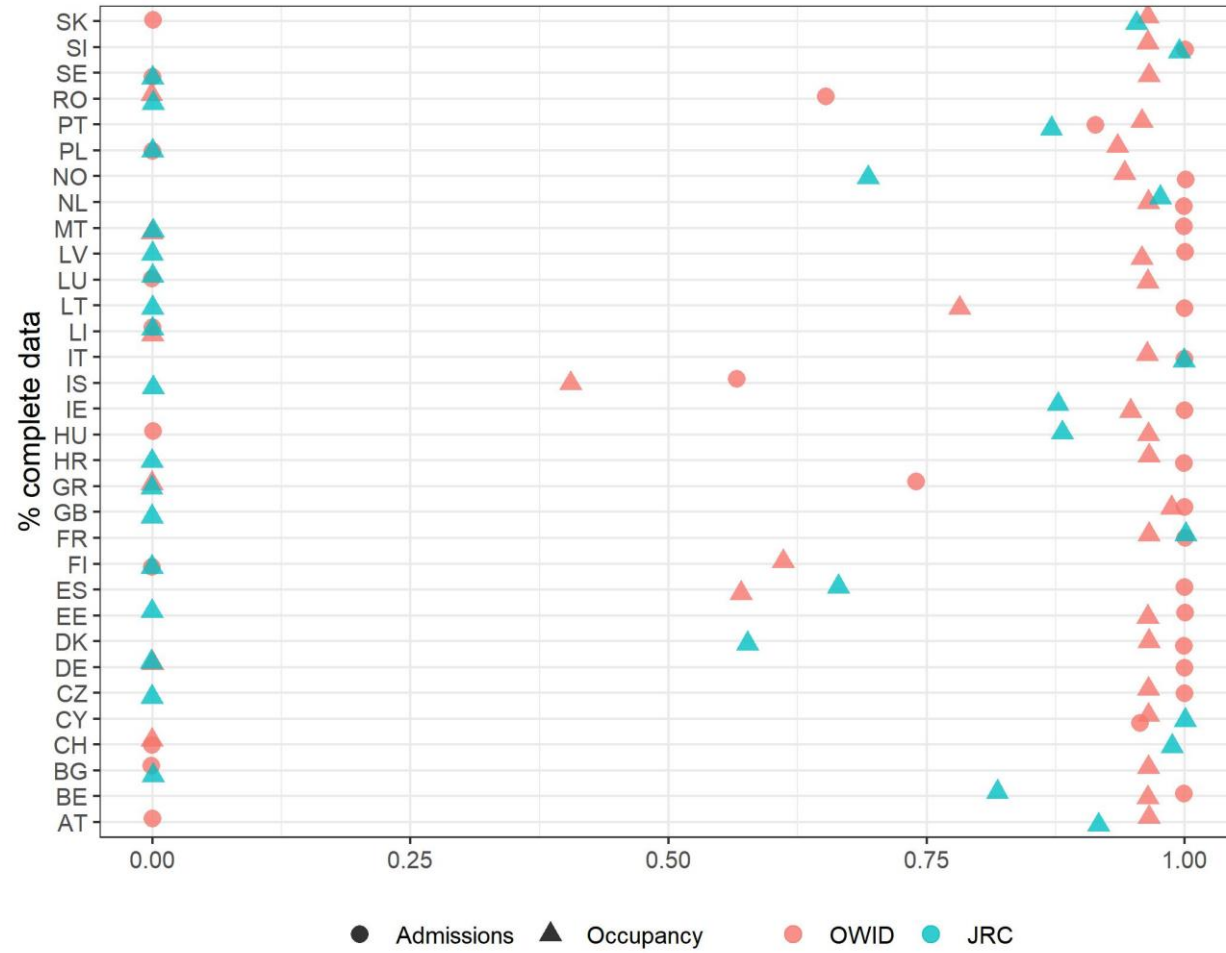Missing data

ECDC / OWID data coverage across 32 hub locations

	Locations covered
Hospital occupancy	26
ICU occupancy	20
Hospital admissions	22
ICU admissions	14

		Austria	Belgium	Bulgaria	Switzerlan	Cyprus	Czechia	Germany	Denmark	Estonia	Spain	Finland	France	United Kin	Greece	Croatia	Hungary
Occupancy	Hospital	0.96	0.96	0.96	-	0.96	0.96	-	0.96	0.96	0.57	0.61	0.96	0.99	-	0.96	0.96
	ICU	0.96	0.96	0.96	-	0.96	0.96	0.96	0.96	0.96	0.57	0.61	0.96	0.99	-	-	-
Admissions	Hospital	-	1.00	-	-	0.96	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00	0.74	1.00	-
	ICU	-	-	-	-	0.96	1.00	-	-	0.91	1.00	-	1.00	-	1.00	-	-

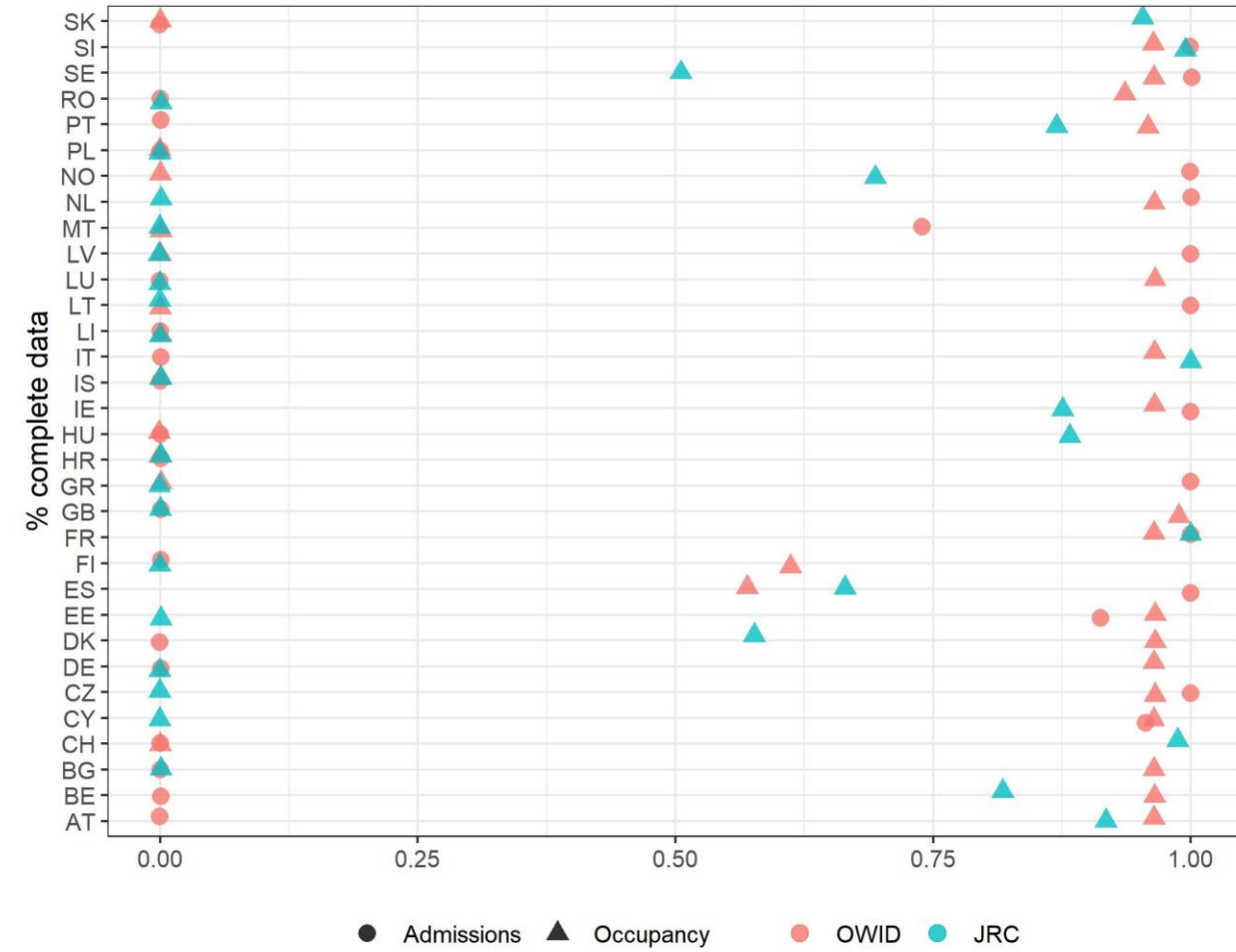|		Ireland	Iceland	Italy	Liechtenst	Lithuania	Luxembou	Latvia	Malta	Netherlan	Norway	Poland	Portugal	Romania	Sweden	Slovenia	Slovakia
Occupancy	Hospital	0.95	0.41	0.96	-	0.78	0.96	0.96	-	0.96	0.94	0.94	0.96	-	0.96	0.96	0.96
	ICU	0.96	-	0.96	-	-	0.96	-	-	0.96	-	-	0.96	0.94	0.96	0.96	-
Admissions	Hospital	1.00	0.57	1.00	-	1.00	-	1.00	1.00	1.00	1.00	-	0.91	0.65	-	1.00	-
	ICU	1.00	-	-	-	1.00	-	1.00	0.74	1.00	1.00	-	-	-	1.00	1.00	-

Missing data lookup by location

General hospital data: completeness for hub countries by source and type

ICU data: completeness for hub countries by source and type

Admissions ● Occupancy ▲ OWID ● JRC ●

Note: JRC does not publish admissions data