Respiratory Viruses in Luxembourg (ReViLux)

Report – Sentinel Week 47 and Sequencing Update

Executive summary

The sentinel network detected a low epidemic activity over the last week, based on 4.8 % of consultations being associated with influenza-like illness. Among the specimen collected by the sentinel network over the last two weeks, the percentage of positive tests for Human rhinovirus was 27.6%, 15.2% for SARS-CoV-2 and 9.7 % for RSV.

Concerning SARS-CoV-2 genomic surveillance, since late February 2023 recombinant strains that combine characteristics of other variants have been dominant in Luxembourg. Over the past few weeks, the estimated distribution of recombinant EG.5 (descendant of XBB.1.9.2) was 31.0% (95%CI: 26.0-36.0 %) and XBB.1.5 proportion was 11.8% (95%CI: 8.3-15.2%). BA.2.86 is an emerging SARS-CoV-2 lineage characterized by a high number of spike protein mutation. In recent weeks, BA.2.86 circulation has increased to 6% (95%CI: 3.5-8.6%).

Introduction

The Laboratoire national de santé, as **National Reference Laboratory for Acute Respiratory Infections** in Luxembourg, performs close surveillance on respiratory viruses, with a special focus on SARS-CoV-2. The main monitoring activities are:

- **The Sentinel Surveillance**. It provides a broad picture of respiratory diseases affecting the Luxembourgish population, based on clinical and laboratory data.
- **The SARS-CoV-2 Genomic Surveillance**. It enables detailed observation of SARS-CoV-2 variants and mutations through time and space, as well as studying specific groups of interest.

The objective of the ReViLux report is to inform public health actions in Luxembourg.

Sentinel Surveillance Network

The Sentinel Surveillance aims at monitoring the circulating respiratory viruses, from traditional ones like Influenza to more recent ones like SARS-CoV-2, and hence underpin public health actions. The Sentinel Network is a group of general practitioners and paediatricians spread over the country. They report the weekly number of patients showing symptoms suggestive of acute respiratory infection (ARI) and influenza-like illness (ILI), and those patients are then sampled and tested for a panel of respiratory viruses. The circulation of respiratory viruses in the north hemisphere is generally monitored by seasons that go from week 40 to week 20. The period between weeks 20 and 40 is usually called inter-season.

Clinical results

Last week, 4.8% of the consultations were reported as ILI, which represents a low epidemic activity for Luxembourg, according to ECDC and the Moving Epidemic Method. The history of ILI consultations is displayed in Figure 1, and a detailed summary of the number of ARI and ILI cases during the last four weeks is included in Table 1.

Laboratory results

Over the last four weeks, the most frequently detected viruses (according to positivity rates) were Human rhinovirus (27.6%), followed by SARS-CoV-2 (15.2%) and RSV (9.7%). So far 21 RSV detections were further subtyped as either RSV A (N=16) or RSV B (N=5). Influenza virus A positivity remains at 2%. An overview of the circulating viral pathogens during the current and previous inter- season is displayed in Figure 2 and Table 2.

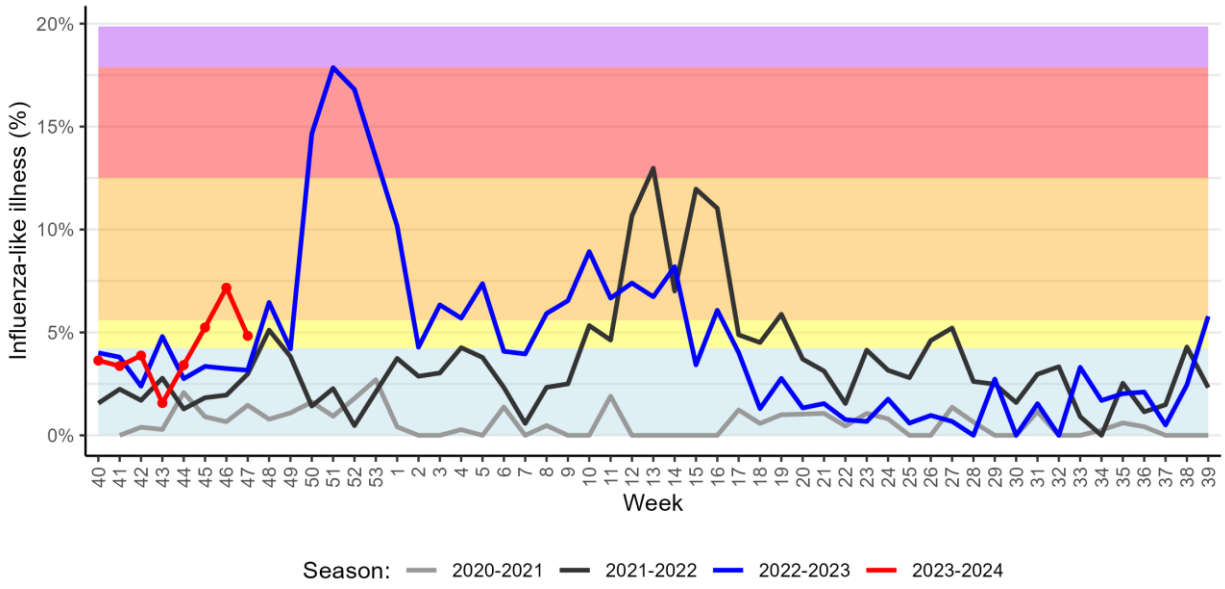

Figure 1. Percentage of patients with influenza-like illness over the last three seasons
Background colours according to intensity of circulation: baseline, low, medium, high, very high.

Table 1. Syndromic surveillance over the last 4 weeks

Week	ARI		ILI		Total consultations
	N	%	N	%	
2023/44	47	22.93	7	3.41	205
2023/45	45	18.15	13	5.24	248
2023/46	54	19.35	20	7.17	279
2023/47	61	15.52	19	4.83	393

ARI: Acute Respiratory Infections; ILI: Influenza-Like Illness.

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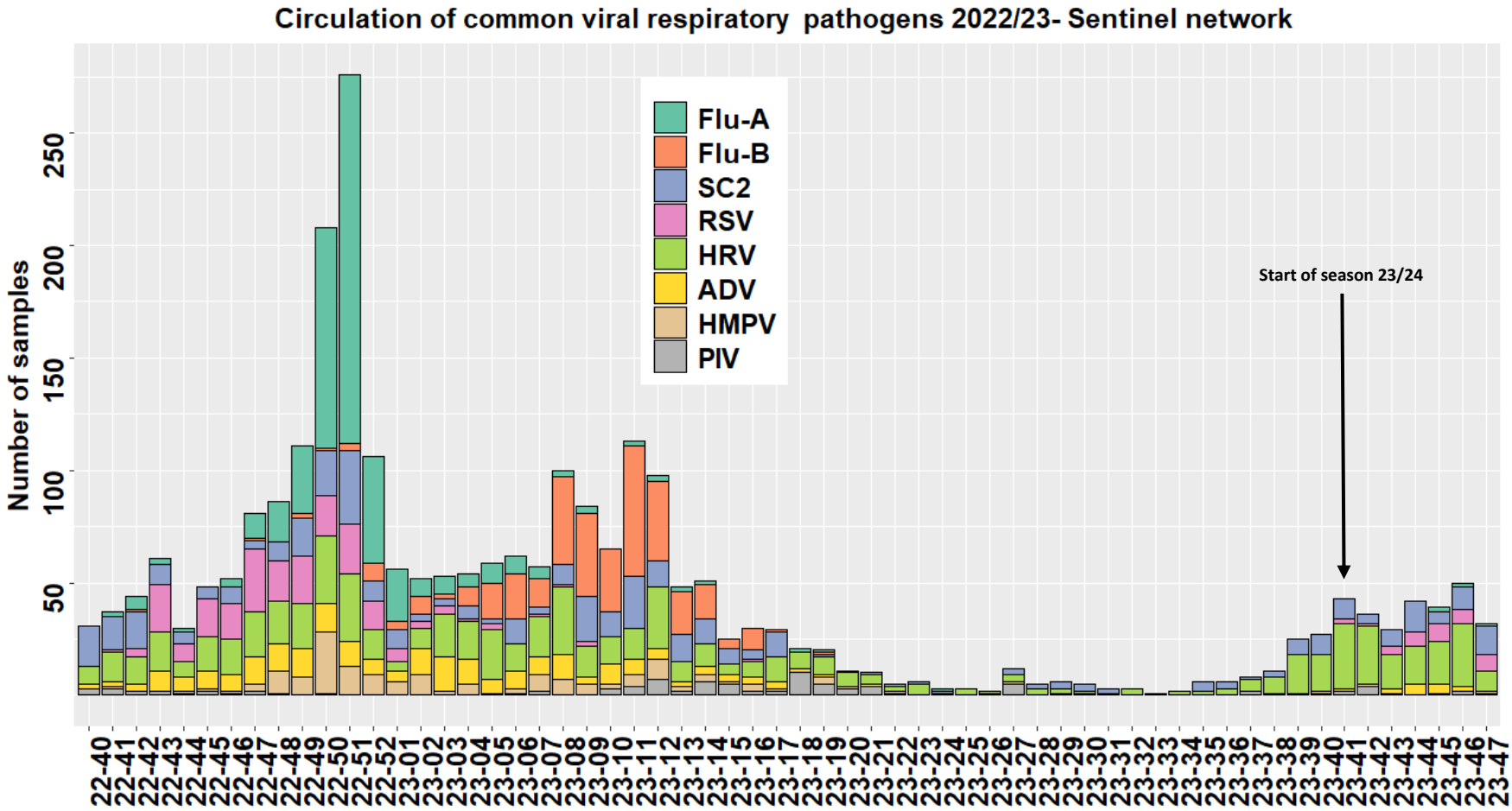

Figure 2. Distribution of respiratory viruses detected within the Sentinel Network, by calendar week. Results from last weeks are not yet consolidated.

FLU-A: influenzavirus A; FLU-B: influenzavirus B; PIV: parainfluenzavirus; RSV: respiratory syncytial virus; ADV: adenovirus; MPV: metapneumovirus; HRV: human rhinovirus; SC2: SARS-CoV-2.

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Table 2. Distribution of respiratory viruses detected within the Sentinel Network previous 4 weeks compared to previous year.

Virus	Season 23/24 weeks (46/47)		Season 22/23 weeks (46/47)	
	N*	Positivity rate (%)	N*	Positivity rate (%)
Human rhinovirus	37	27.6	36	25.7
SARS-CoV-2	23	15.2	11	7.0
Respiratory syncytial virus	13	9.7	44	31.4
Adenovirus	3	2.2	19	13.6
Influenzavirus A	3	2.0	15	9.4
Parainfluenzavirus	3	2.2	3	2.1
Metapneumovirus	0	0.0	4	2.9
Influenzavirus B	0	0.0	1	0.6
Total	**82**		**133**	

**Co-infection cases counted once for each virus detected.*

SARS-CoV-2 Genomic Surveillance

SARS-CoV-2 has posed a serious threat to the world population since 2020, but over the past 12 months increased immunity and the availability of highly effective vaccines have decreased the pressure on the health system. However, the risk of new variants emerging remains and monitoring on lower scale is still required.

Changes to SARS-CoV-2 testing came into effect at the end of March 2023, with reduction in the use of PCR testing. This will also affect the genomic surveillance and sequencing data will be biased towards hospital admissions and more severe cases. However, LNS continues to monitor, assess risks and prepare the next season.

LNS receives positive specimens (nasopharyngeal or oropharyngeal swabs analysed by RT-PCR) from the national network of laboratories. All hospital specimens are sequenced, as well as a representative selection of community specimens. Illumina and Nanopore devices are used. When needed, an additional screening by targeted PCR is also performed to enable earlier evaluation of the spread of newly emerging variants.

Bioinformatic analyses are based on a standardised pipeline, and lineage assignment is performed through the PANGOLin software (4.3, pango-data 1.23, mode UShER). In order to allow easier visualisation, WHO and Nextstrain categorisations are also used.

Sequencing activity

332 samples from 1,265 cases (26%) reported in Luxembourg were sequenced with specimen dates between week 2023/40 and 2023/43. Approximately 61% were hospital samples and the remaining samples were community samples. Sequencing data probably does not fully represent virus circulation within the population.

Variant circulation

For sequences collected in Luxembourg from 2nd to 29th of October 2023, 31.0% were classified as EG.5 (descendant of XBB.1.9.2). The proportion of this variant decreased, from 35.8 % to 31.0%. In recent weeks, more cases of BA.2.86 have been identified with an estimated proportion of 6%. An overview of the variants and lineages circulating since beginning of 2023 is displayed in Figure 5, and further details are shown in Table 3. The history of the circulation of each variant since January 2021 is displayed in Figure 4.

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Table 3. Distribution of SARS-CoV-2 lineages detected during weeks 2023/36 to 2023/43. Previously reported cases might be updated by retrospective analysis.

Lineage	weeks 36-39		weeks 40-43	
	%	CI %	%	CI %
Recomb EG.5	35.8	30.2 – 41.5	31.0	26.0 – 36.0
Recomb XBB1.9	15.4	11.1 – 19.7	19.6	15.3 – 23.9
Recomb XBB*	20.1	15.4 – 24.8	14.2	10.4 – 17.9
Recomb XBB.1.16	12.5	8.7 – 16.4	12.1	8.6 – 15.6
Recomb XBB.1.5	8.6	5.3 – 11.9	11.8	8.3 – 15.2
BA.2.86	**1.1**	**0.0 – 2.3**	**6.0**	**3.5 – 8.6**
Others	6.5	3.6 – 9.3	5.4	3.0 – 7.9

**XBB excludes EG.5, XBB.1.16, XBB.1.5, XBB.1.16 and XBB.1.9 and XBB.1.9 excludes EG.5*

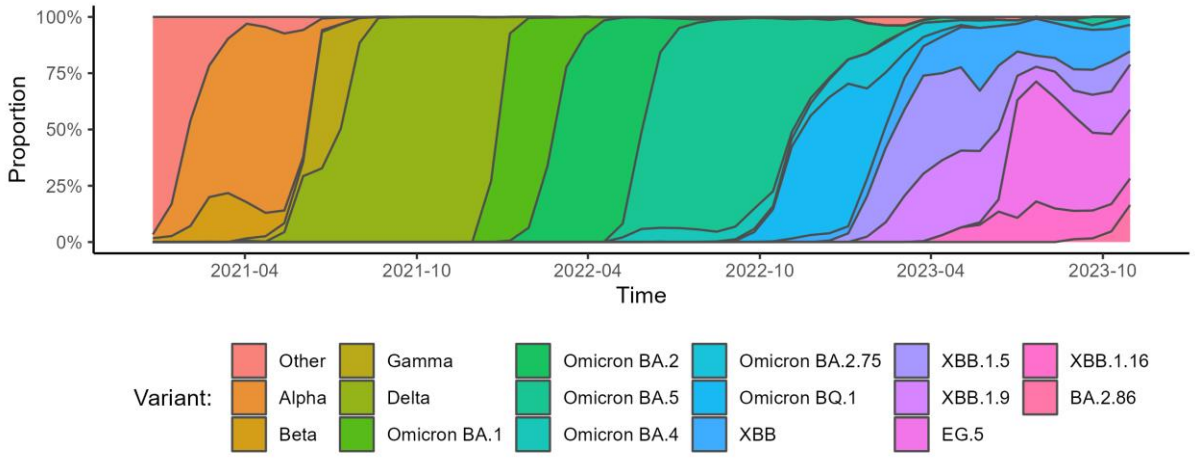

Figure 4. Proportion of each variant circulating in Luxembourg since January 2021.

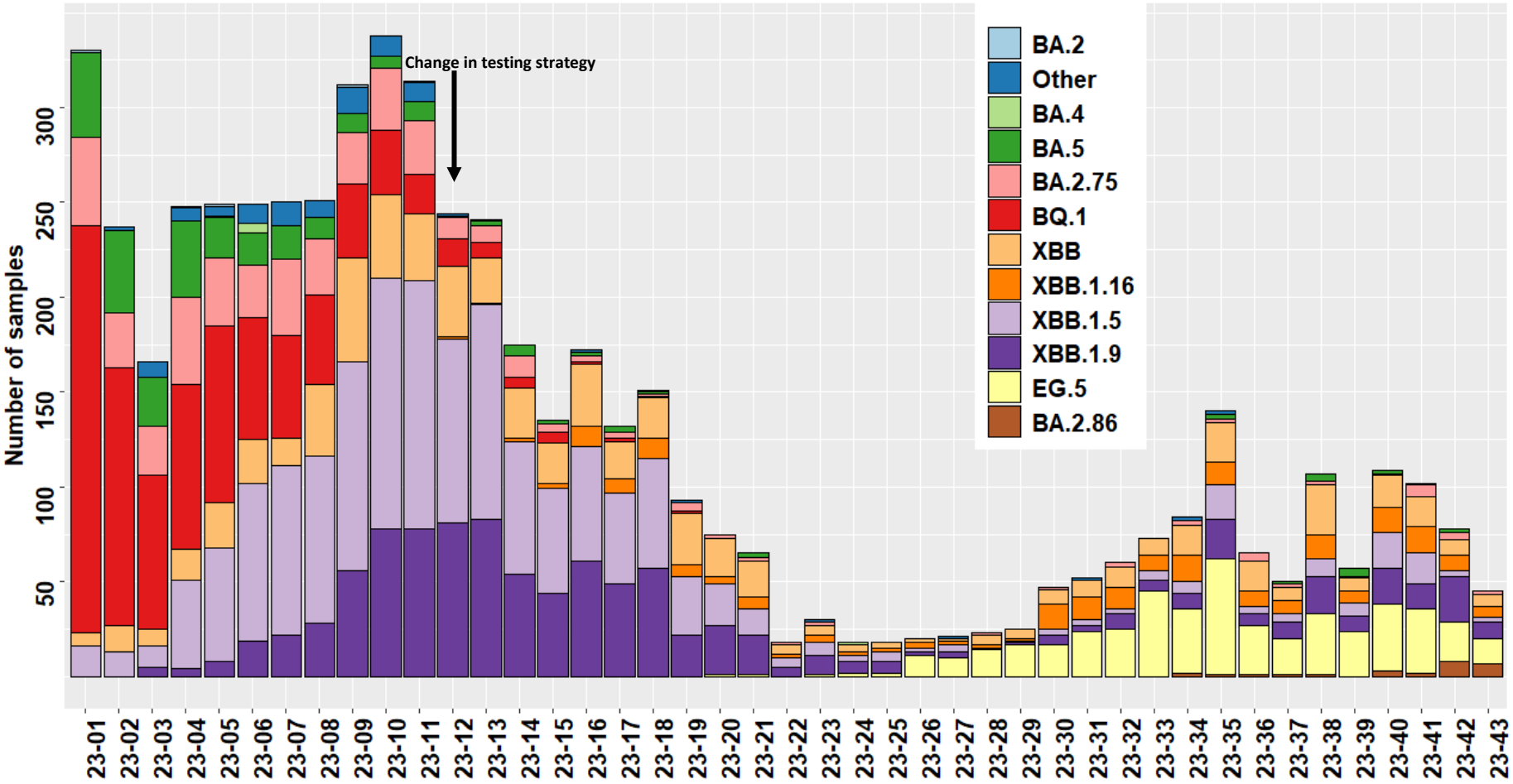

Figure 5. Distribution of lineages since beginning of 2023.

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Clinical and epidemiological factors

Over the past 4 weeks, 203 (61.1 %) samples from hospital laboratories and 129 (38.9%) samples from private laboratories/ sentinel practitioners were sequenced. Table 4 compares sampling setting of EG.5 with XBB.1.5 and XBB.1.9 variants combined.

Table 4. Comparison of lineage distribution by sampling setting.

Lineage	Community			Hospital		
	Women	Men	**Total**	Women	Men	**Total**
Recomb EG.5	43.4%	54.8%	**47.6%**	52.3%	50.0%	**51.2%**
Recomb XBB*	56.6%	45.2%	**52.4%**	47.7%	50.0%	**48.8%**
Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**

**XBB.1.5 and XBB.1.9 cases*

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