

Sentinel surveillance in the digital era: why bother?

Yolanda Mueller, MD MAS

Senior lecturer at Unisanté, Department of Family Medicine, Lausanne, Switzerland

Vice-president of the Sentinel Program Commission

Talk outline

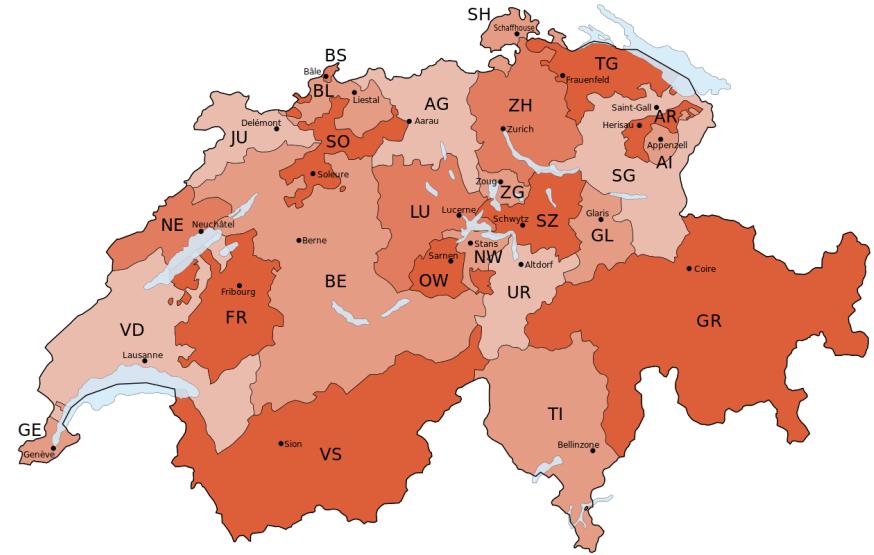
- Presentation of Sentinel
- Examples of Sentinel projects
- Influenza projects

Disclaimer

- The content of this talk represents my personal opinion and neither the opinion of Sentinella, Unisanté, nor the FOPH
- I thank the FOPH for lending some slides

Swiss context

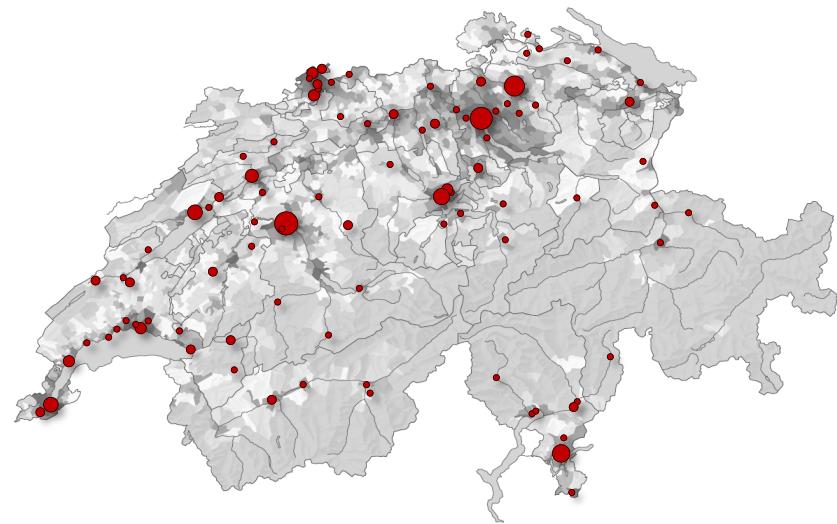
- 23 cantons
- 23 health ministries
- 23 health systems
- 1 federal + 23 cantonal public health offices
- 1 law on epidemics!



Source: wikipedia commons, Switzerland Cantons Map with Names and Capitals (french).svg

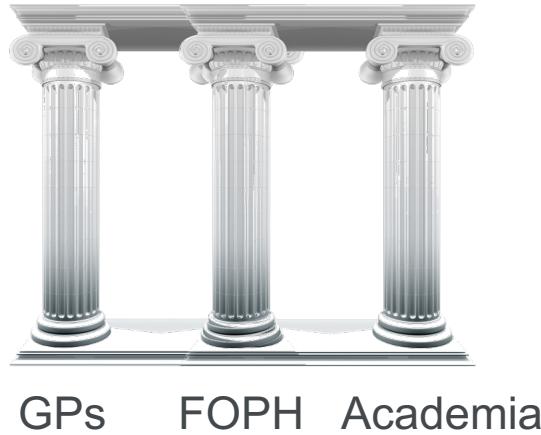
Sentinella – Swiss Sentinel Surveillance Network

- Founded in 1986
- Main interest: surveillance of infectious diseases in Switzerland
- Currently about 165 participants representing about 2% of Swiss general practitioners
- General internal medicine and paediatricians
- Voluntary participation



Sentinella participants on map with population density

Sentinella – Organisation and governance

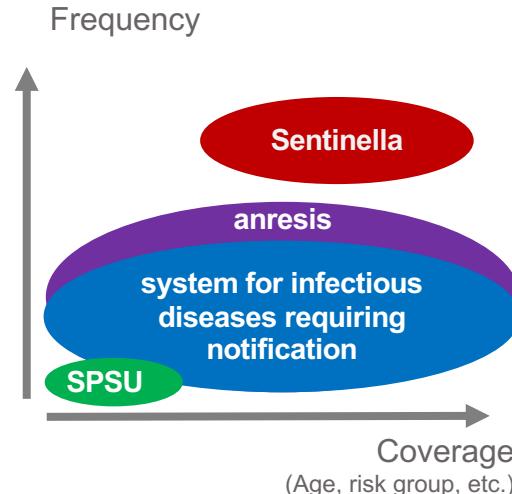


- Participating general practitioners
- Federal Office of Public Health (FOPH)
 - System operation
 - Data management
- 6 University institutes of primary care

- Steering committee
 - Representatives of participating general practitioners, FOPH and institutes of primary care
 - 3 annual meetings
 - Decides about notification topics / scientific program / reviews forms

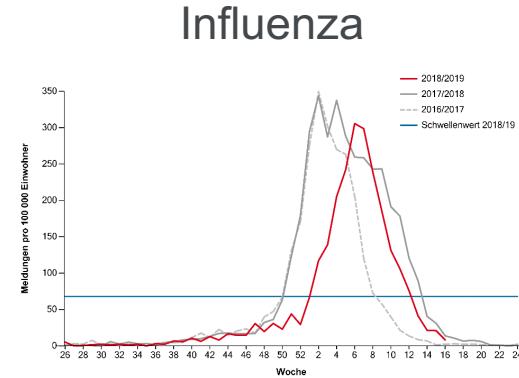
Sentinella – interest (1)

- Surveillance of common infectious diseases



anresis: antibiotic resistance

SPSU: Swiss paediatric surveillance unit



Sentinella – interest (2)

- Surveillance of common infectious diseases
- Data collection for planning and evaluation of public health measures
- Research on topics relevant for primary care
- Topics 2019
 - Influenza
 - Pertussis
 - Mumps
 - Lyme borreliosis / tick bites
 - Herpes zoster / Postherpetic neuralgia
 - Legionellosis
 - Antibiotic prescription
 - Home visits



Influenza surveillance in Sentinel

ILI case definition



- High fever ($>38^{\circ}\text{C}$), usually of sudden onset

AND

- At least one of the following:
 - Cough
 - Sore throat
- Optionnally: intense malaise or fatigue, myalgia, arthralgia, headache or generalized pain as well as gastrointestinal symptoms

~ 1999 WHO definition



Influenza-like illness (ILI)

- Sudden onset of symptoms
- AND
- at least one of the following four systemic symptoms:
- Fever or feverishness
- Malaise
- Headache
- Myalgia
- AND
- At least one of the following three respiratory symptoms:
- Cough
- Sore throat
- Shortness of breath

Influenza surveillance in Sentinella

- Symptom-based (ILI): n=165
- Swabbing in a subset of practices (n=70)
- Exhaustive at beginning and end
- 1:5 sampling in-between
- rRT-PCR in reference laboratory (National Reference Center of Influenza, Geneva)
- 40-50% of swabs positive

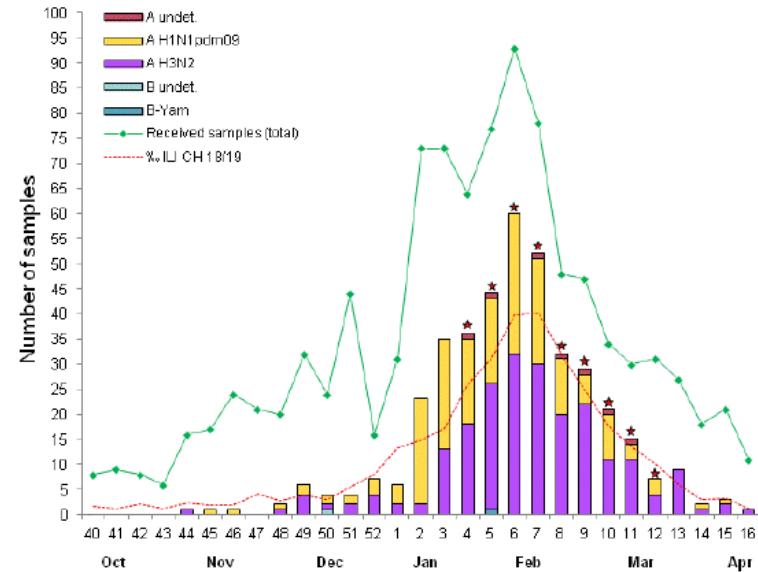


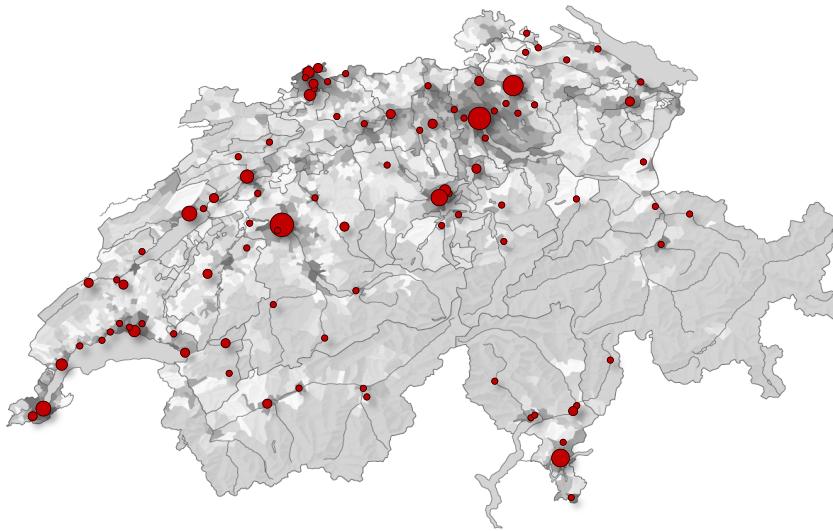
Figure 5. Schematic illustration of the 2018/19 influenza season. A undet.: influenza A, but the type could not be determined. B undet.: influenza B, but the type could not be determined; B-Yam: influenza B of Yamagata lineage; ILI 18/19: ILI cases reported during the 2018/19 season (%); red stars indicate the weeks when Sentinel practitioners were requested to send only 1 out of 5 ILI case samples for influenza screening (weeks 4 to 12/2019).

Ref: Influenza virus surveillance in Switzerland, report 2018-2019, CNRI

Representativity of Sentinel?

- Not necessarily a must have for pure sentinel purposes
- But nice to have!

Geographic representativity?

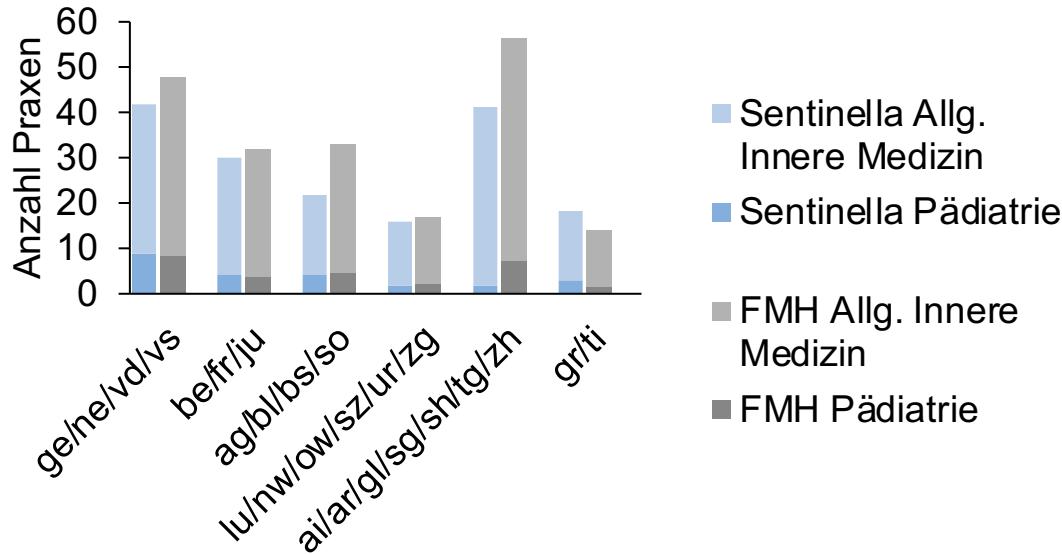


- Sentinel practices are where the people live

Courtesy of Raphaël Rytz, FOPH

Representative of GP-population by region?

Number of members by region and comparison with number of specialist titles (N=169)



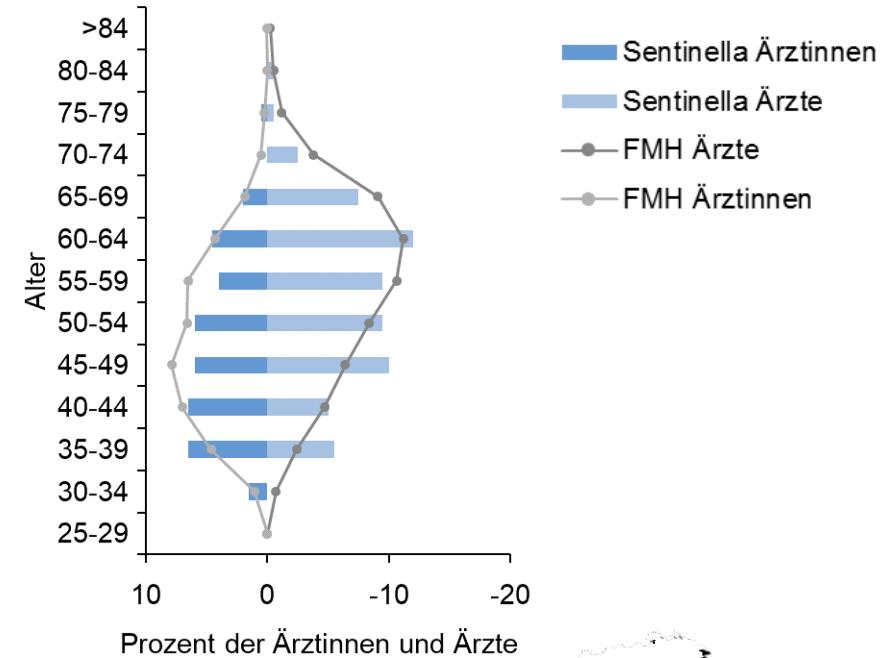
Some regions a bit less represented

Courtesy of Raphaël Rytz, FOPH

Representative of GP-population by age and gender

	Sentinella	FMH
% Women	37.5	40.8
% Men	62.5	59.2

Mean age	Sentinella	FMH
2014	54.5	54.2
2015	54.4	54.4
2016	54.7	54.6
2017	54.6	54.7
2018	53.8	54.7
2019	53.1	



Courtesy of Raphaël Rytz, FOPH

Why representativity matters

- When going beyond infectious disease surveillance
- Grey zone with health systems research
- Example: antibiotic prescription

Antibiotics prescription – Sentinella study

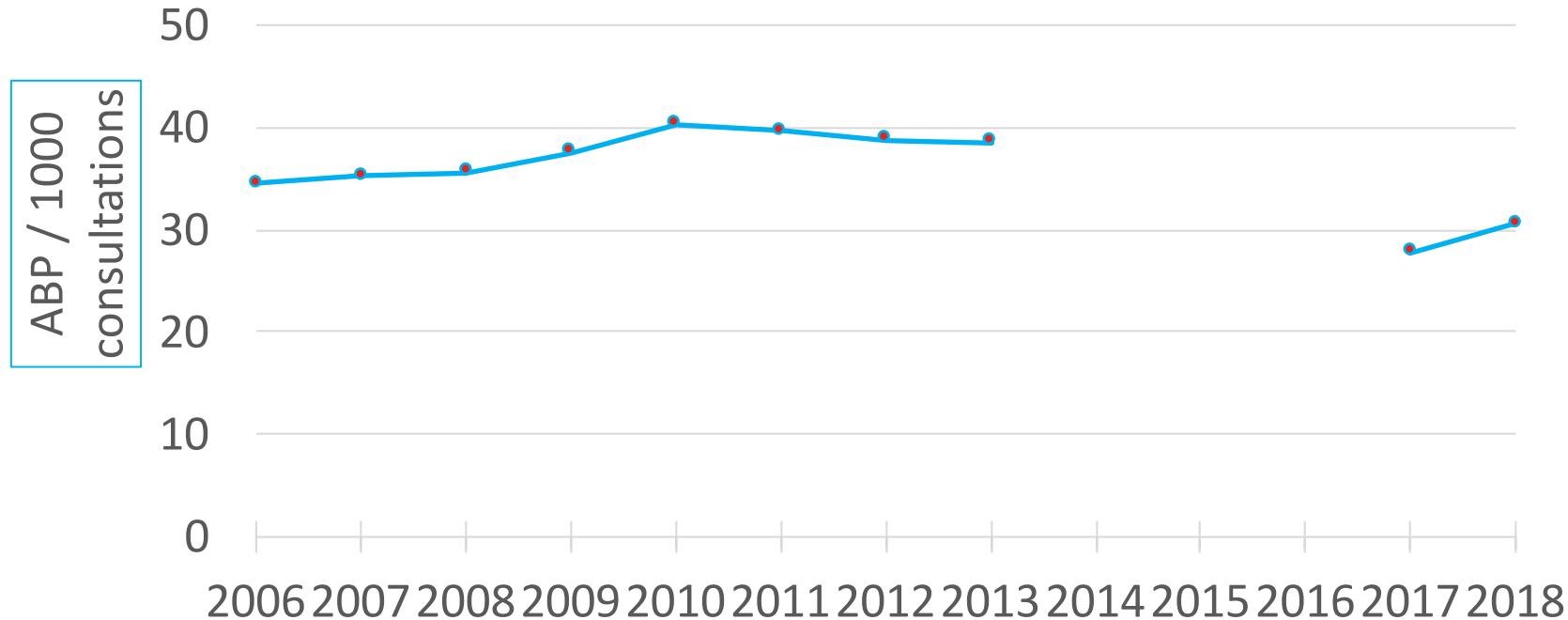
- Initial surveillance period 2006-2013
 - Increasing penicillin prescription
 - Increasing «others» antibiotics
- Surveillance restarted in 2017
 - More detailed AB-classes for better resolution
 - StAR-M, new guidelines since 2018
- Increasing awareness for AB-prescription
- Sentinella members: change over time



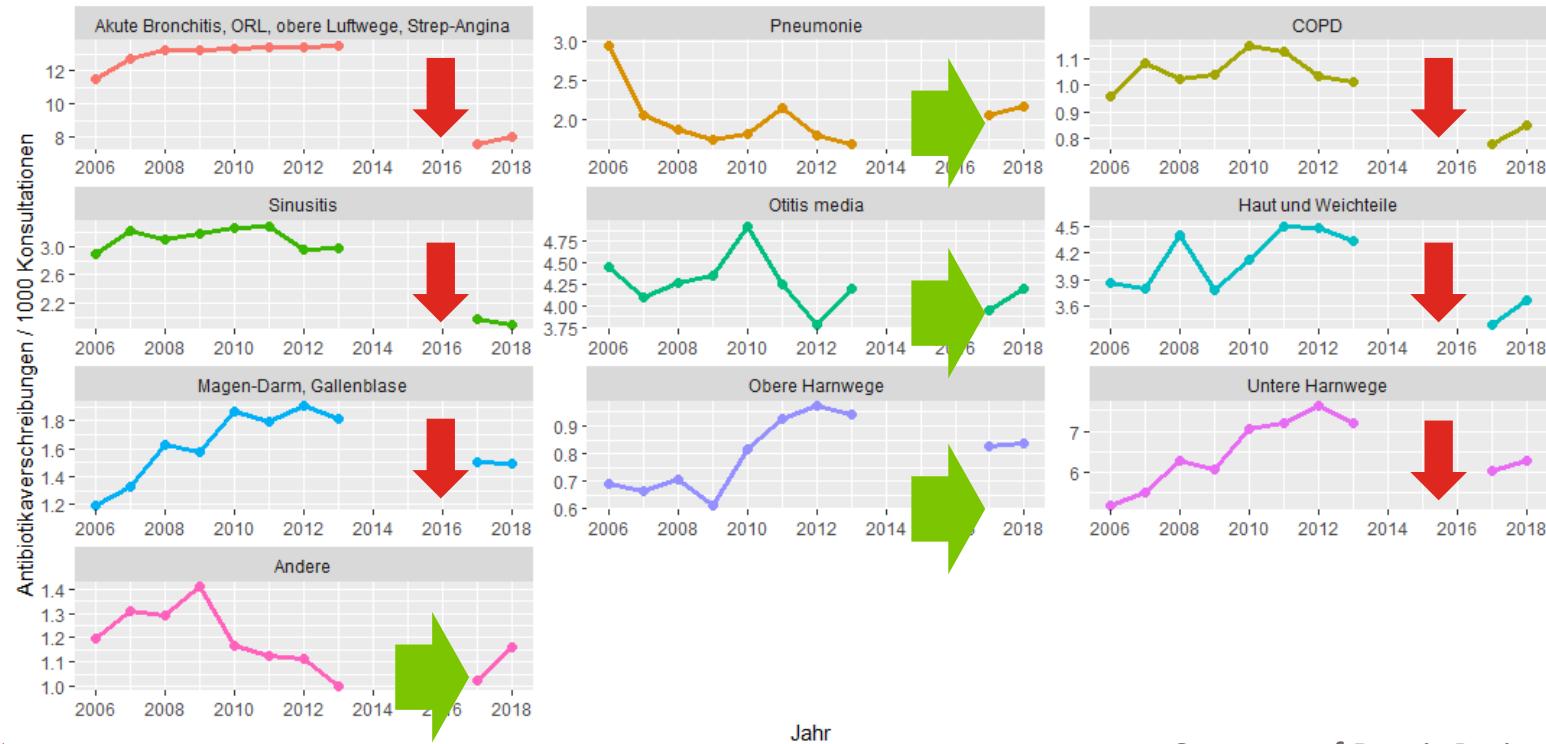
<https://kssg.guidelines.ch/>

Courtesy of Damir Perisa, FOPH

Antibiotics prescription (ABP) / 1000 consultations



ABP incidence per antibiotics class



Other examples of research projects

- Colorectal cancer screening
- Management of sleep disorders
- Multimorbidity survey
- Home visits

Why do health systems research in Sentinella?

- Because Switzerland is a data desert
 - No unified EMR
 - Very limited compulsory data collection at federal level
 - Main data provider: private health insurers
- If we do it
 - Need to calibrate our sample?
 - Standardize our methods (mixed models)

Sentinella for research?



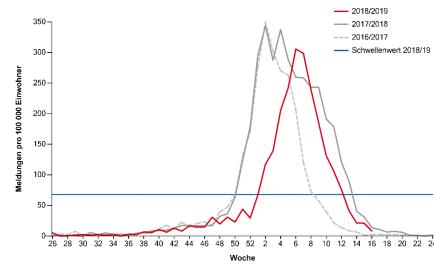
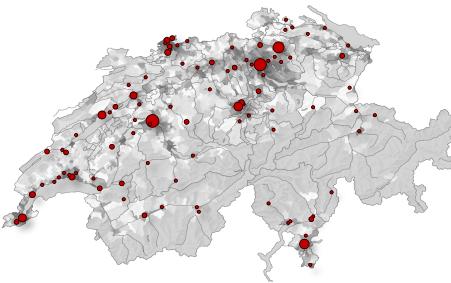
- Motivated physicians
- Financial compensation
- Good response rates
- Clinical information



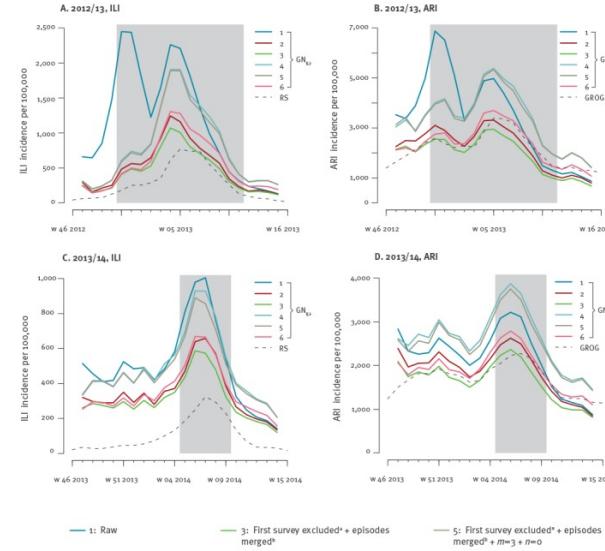
- Selection bias
- Unclear role

Existing influenza surveillance (population)

- Sentinella



- Participatory



Ref: Guerrisi et al, Eurosurveillance 2018

Making best use of Sentinel set-up

Influenza project: understanding influenza transmission in primary care practices

Research question

- Are healthcare workers at increased risk of influenza compared to the general population?
- Aim:
 - to estimate the association between being professionally active in the healthcare-system and consulting for an influenza-like illness (ILI) in primary care practices of the Sentinel network

A case-control study within Sentinella

- **Cases:** influenza-like-illness, resp. confirmed influenza, declared within Sentinella in 2018-2019
- **Controls:** all physician-patient contacts during week 11-12, 2019 (minus those counted among the cases)
 - Routinely: age and sex
- Exposure of interest: ≥ 15 years old: are you **professionally active[°] in the healthcare system***? If yes:
 - Which profession[§]?
 - Which context?
- **Outcome:** association (odd ratio) between professional activity in the healthcare system and consulting for ILI, respectively confirmed influenza

Definitions:

- ° Professionally active: definition of the International Labor Office

* Healthcare system: part of the health system in direct contact with patients

§ International classification of profession type, also used by OFS

Results

- [Unpublished results]

Rationale

- Do patients get influenza while visiting GP practices?
 - Significant proportion of general population consult GP every year for an ILI (3%)
 - Primary care staff highly exposed
 - Suboptimal vaccine coverage and infection control measures

Specific aims

1. Understand **patterns of influenza infection** among primary care practice (PCP) physicians and staff («staff»).
2. **Document influenza transmission** from staff to patient in primary care practices.
3. Model influenza transmission in primary care practices and **estimate the effectiveness of vaccination** and other control measures to prevent transmission

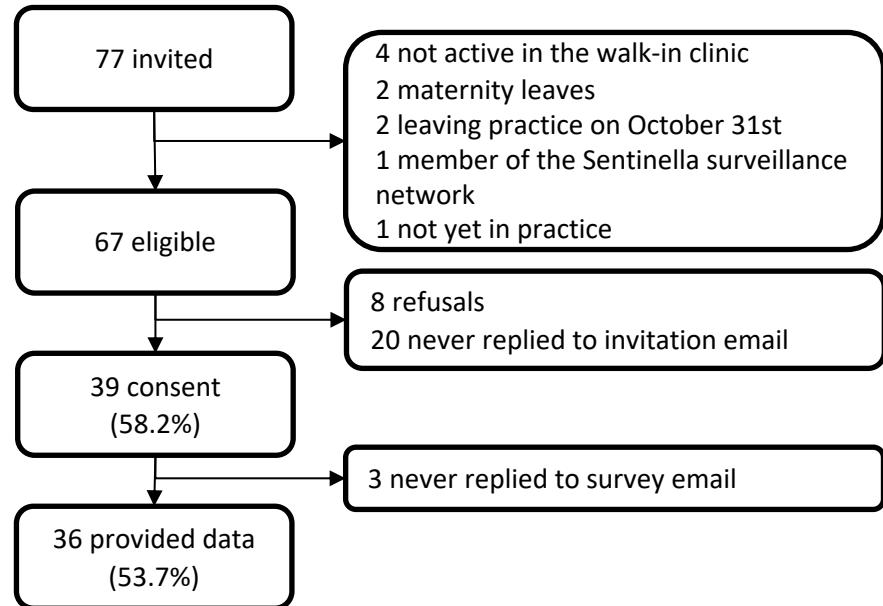
Influenza surveillance among staff

- Hospital-based study; the TransFLUas study
 - 59 staff / 192 patients
 - Mid-turbinate nasal swabs and illness diaries on a daily basis

Ref: Kuster et al, BMC Inf Dis 2019

Participation of staff in primary care practices?

- Pilot study in 3 practices
- Physicians and staff invited to answer weekly online questionnaire
- Auto- or heteroswab in case of symptoms



un

The screenshot shows the Microsoft Word ribbon interface. The tabs visible are 'Presse-papiers' (Clipboard), 'Texte simple' (Simple Text), 'Noms' (Names), 'Inclure' (Include), 'Options' (Options), and 'Vérification' (Check Spelling). The 'Texte simple' tab is active. In the main content area, there is a 'Envoyer' (Send) button. Below it, four input fields are shown: 'De...' containing 'Muller Chabloz Jolanda;', 'À...' containing 'albertlevert@svmed.ch', 'Cc...', and 'Cc...'. Below these fields is an 'Objet:' field containing 'Grippe - questionnaire individuel semaine 40'. The main body of the email contains the following text:

Bonjour,
Merci de compléter le questionnaire pour la semaine 40.
Bonne journée.
L'équipe ARIPCW0

You may open the survey in your web browser by clicking the link below:
[Individu Hebdo](#)

If the link above does not work, try copying the link below into your web browser:
<https://redcap-val.pmu-lausanne.ch/surveys/?s=T7ewByf86r>

This link is unique to you and should not be forwarded to others.

32

Resize font:

Individu Hebdo

Identification

Date du remplissage Today D-M-Y**Heure du remplissage** Now H:M**Nombre de jours depuis le dernier questionnaire hebdomadaire rempli**

Symptômes

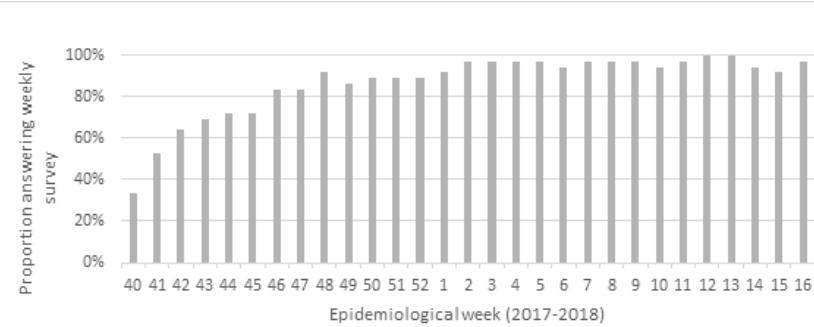
Depuis la dernière fois, avez-vous présenté l'un des symptômes suivants:

- Nez qui coule / nez bouché
- Mal à la gorge
- Mal à la tête
- Mal aux oreilles (ou à une oreille)
- Mal aux muscles
- Mal aux articulations
- Fatigue
- Sensation de fièvre
- Voix enrouée / extinction de voix
- Toux
- Crachats
- Douleur en respirant
- Difficulté à respirer / essoufflement
- Nausées
- Mal au ventre
- Vomissements
- Diarrhées

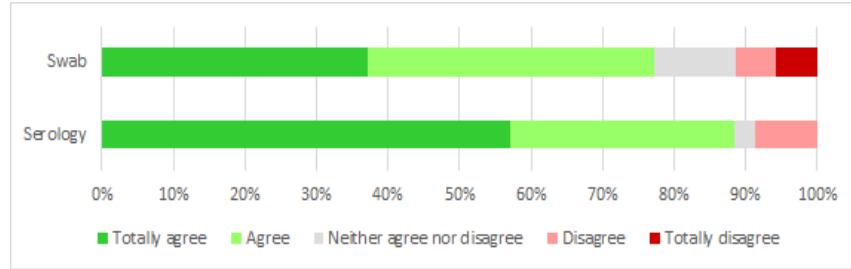
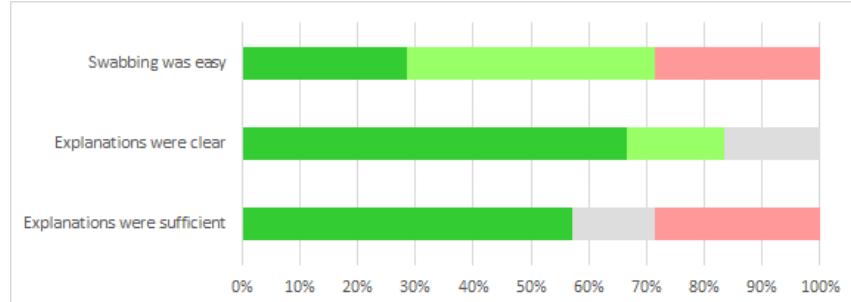
Vous n'avez eu aucun symptôme Je confirme

Results pilot study

Participation maintained over time



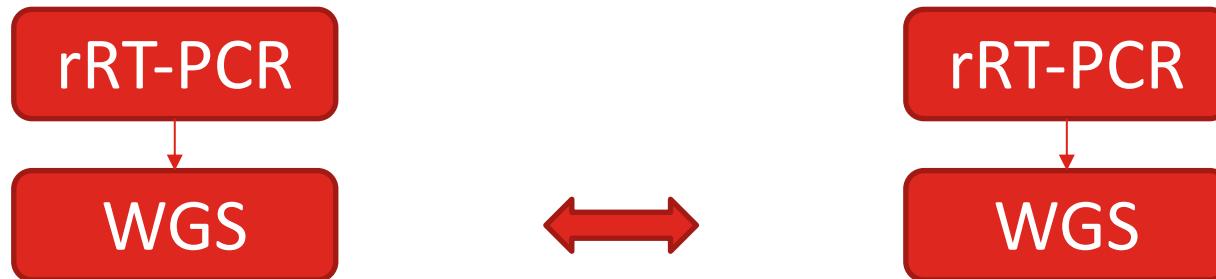
Swabbing was easy



Ref: Martin et al, submitted

Combination of staff and patient surveillance

- Patients
 - Classic sentinel
 - ILI -> swab
- Physicians and staff
 - Participatory
 - Symptom-based
 - ILI -> swab



Methods

- 1. Prospective staff cohort** during two seasons among 75 practice staff of Sentinella practices
 - Influenza-specific serology at beginning and end of the influenza transmission season (+ post vaccination) (N=199 vacc, 199 non-vacc)
 - Prospective symptom-based surveillance among practice staff
 - Nasopharyngeal swabs in case of symptoms (N=40 practices)
- 2. Whole genome sequencing** of influenza viruses identified in patients and staff of Sentinella practices
- 3. Mathematical model of influenza transmission** that includes health sector as a specific compartment for transmission

Discussion

- Sentinel system
 - For which purpose?
 - Fit for purpose?
 - If used to extrapolate GP habits, need for calibration?
 - Updated procedures
 - Review case definitions
 - Hybrid systems with EMR extraction
 - Periodic review of assumptions

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Thanks!

