Learning from the past or forgetting the past? How better knowledge of scenarios from past pandemics could strengthen pandemic preparedness

PD Dr. Kaspar Staub & Team / Collaborators

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Preface

THANK YOU!

- For this opportunity (lecture)
- For previous and ongoing collaborations (since 2011!)
- Your interest in history & the long-term perspective
1. The *Anthropometrics & Historical Epidemiology* research group @IEM
Anthropometrics & Historical Epidemiology Group

- PI Kaspar Staub, 4 Postdocs, 2 PhD students, 5 Dr. med. Students, 10 MSc/MMed students

- **Focus:** Interactions between human health and the changing (health) environment during the last 200 years.

  - Anthropometry (phenotypic plasticity) – How has the size and shape of the body adapted to the changing environment (incl. most recent trends)?

  - Historical Epidemiology (disease environment) – How have morbidity/mortality changed? Since 10 years work on Influenza, Typhoid fever, Tb, Cholera, Diphtheria, Mortality in general, …

- **Approach:** Quantitative, interdisciplinary, collaborative, connecting the past and the present, digitizing archival data, bringing data sets together, int. network (PANSOC, EPIBEL, PandemiX Center, etc.).
Unexpected topicality in 2020

- COVID-19 has changed a lot, and intensified our pilot work on 1918 started in 2015.
- Interest in the historical perspective has exploded, but “active” experts and knowledge on past pandemics in Switzerland were few.
- So we invested a lot of time and resources here in the past 2-3 years.
  - 8 publications, 5 funded projects, countless media reports and interviews, 5 new student projects, new collaborations, etc.
- Aim: Start to fill the research gap, digitize and analyse historical data, make past pandemic experiences accessible.

2. Increased interest in the past
Historical Epidemiology – before COVID-19

- Historical experiences are valuable in the case of an outbreak of a novel pathogen, for which nonpharmaceutical countermeasures have to rely on past experiences.

- Health policy specialists benefit from integrating historical experience to avoid interventions failing.

- Historical epidemiology makes historical experience accessible.

- The literature on past influenza pandemics has shown how to integrate lessons from the past into pandemic planning.

- But: Not for Switzerland, there is a large research gap on past pandemics and epidemics since 1850.
Interest in history during times of crisis

- In normal times, crises don't interest that much, not even in science («Most scientists don't care a fig about history.»), Stephen Jay Gould 1996)

- But in times of crisis (or a centenary) this changes abruptly.

- This is very well known from economic crises, and there are numerous publications showing that short memories make it all too easy for crises to recur.
Increase of interest in past pandemics in 2020

To the Editor

Humans tend to place present events in the context of past experiences, especially during crises, when society’s vulnerabilities become apparent in these times, reflection on the learning processes from the past is initiated. All non-pharmaceutical public health countermeasures currently being taken against the COVID-19 outbreak are based on experience gained from past pandemics over the last several centuries, which were mostly caused by influenza (1889/90, 1918/19, 1957/58, 1968/69, 1977/78, and 2009) and twice by coronaviruses (2003 and 2019/20). Among these pandemics, the 1918/19 influenza outbreak (Spanish flu) remains the most devastating, as it caused an estimated 20-100 million deaths worldwide and continues to exemplify the worst-case scenario.

Over the last few months, during the current worldwide COVID-19 pandemic, we have noted an unprecedented and sharp increase in the public and scientific interest toward the influenza outbreak of 1918/19. In fact, both the Google search trends since 2004 (https://trends.google.com) revealed marked increases in searches for Spanish flu on the web and in newspapers in March and April 2020 (Figure 1A). Further, according to a non-systematic PubMed search using the tool PubMed by Year (https://esperr.github.io/pubmed-by-year), the number of listed scientific studies per 100,000 citations (Figure 1B) of the 10 studies that were published in 2020, some can still be attributed to the centenary of the Spanish flu. However, the number of studies explicitly

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**Figure 1** A. Results from the worldwide Google search trends per month and year using the term Spanish flu (black dashed line = web search, red line = news search). B. Yearly number of PubMed listed publications with the terms Spanish flu or influenza 1918 in the title abstract as a proportion of 100,000 listed items per year (Date of searches: 17 July 2020)
3. Vulnerable societies & “Learning from the past”
The “Disaster gap” in Switzerland

Switzerland was spared by major natural disasters between the 1880s and the 1970s. This could have led to a loss of disaster memory, and an underestimation of natural risks by the end of the 20th century (Pfister 2011, 2014).
The “Pandemic Gap” in Switzerland

- In Switzerland (and other European countries), none of the global pandemics after 1920 have reached the severity of the Russian flu in 1889, or the “Spanish” flu in 1918.

- Absence of pandemics led to a loss of ‘pandemic disaster memory’ and increased disregard of immediate pandemic risks in the population and among policymakers.

- Way out: Making past pandemic experiences accessible and increase science communication.

https://smw.ch/op-eds/post/the-pandemic-gap

Figure 1: The “pandemic gap” (absence of pandemics) in Switzerland. The development of deaths from influenza per 100,000 inhabitants (as reported by official Swiss federal statistics [7–9]) shows the catastrophic extent of the Spanish flu of 1918/1919 (especially the second wave) and the pandemic disaster gap across the 20th century (when Switzerland was largely spared from pandemics, it did not develop a corresponding culture of memory and coping). The two pandemics not caused by influenza (SARS and COVID-19) are shown in brackets (the number of deaths for COVID-19 was estimated at 3000 by November 2020).
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Pandemic gap is nothing new, also 1890 -> 1918

“The memory of doctors is short, and that of lay people too. Everywhere we are amazed at the viciousness of this flu epidemic and have completely forgotten that the epidemic around 1890 was not harmless everywhere either ...“

(NZZ, 15. October 1918, at the beginning of the fatal second wave in fall/winter 1918)
- This might be true for today's generation, but it is only partly true if you go back a few generations only…

Gastkommentar in der heutigen NZZ: «Wir haben vieles zum ersten Mal gemacht» – Pandemiebewältigung aus Sicht der BAG-Direktorin»
nzz.ch/meinung/die-pa...

10:32 · 03.05.22 · Sprout Social
Vulnerable societies

- Past and present pandemics can be contextualised with the concept of vulnerability (widely discussed in crisis research for a long time, e.g. Füssel 2007, Krämer 2016).

- A system (=society at a certain time and place) is threatened by a triggering event. What disturbances the system is exposed to, how they affect it, and how does the system react to the disturbances?

- The following structural categories (Krämer 2016) are important:
  - Within the “exposure” category, it is important to investigate how exactly a society is exposed to the threat.
  - Within the “coping/resilience” category, the different ways a society can cope with the disruption or learn from its consequences are central. The aim here is to minimise the present/future risks, to adjust and ultimately to increase resilience to future comparable disturbances.
“Learning from the past” – That is not so simple…

- “Learning from the past” must not be oversimplified, as history does not provide universal rules that remain the same across time (Condrau 2020).

- History-as-lessons approach: Assumption that epidemics are structurally comparable events, wherever and whenever they take place (Peckham 2020).

- Although history will likely not repeat itself exactly, clues to the urgent questions (or possible scenarios) nevertheless might be found in research on previous pandemics (Mamelund 2020).

- For this learning from the past to work at all…
  - … the past must be known
  - … there must be a transfer from historians to policy makers.

- History as a discipline should be at the policy table, and public health policy is one of the areas where historical input is valuable to strengthen evidence-based policy making (Berridge 2008).
A debate takes place…

COVID-19: The Power of Historical Lessons

Sven-Erik Mamelund, PhD

ABOUT THE AUTHOR

Sven-Erik Mamelund is with The World Research Institute, Oslo Metropolitan University, Oslo, Norway.

Globally, more than 556 million cases and 1.9 million deaths from coronavirus disease 2019 (COVID-19) have been reported up to January 8, 2021 (but these estimates are unfortunately going to increase), and it is the first influenza pandemic: They found that Michigan had “up to four waves of excess mortality over a span of two years, including a severe one in early 1920. Some countries experienced two waves in late 1918, whereas others had only one.” They also document that the two waves in late 1918 were likely related to the timing of the nationwide imposition of a three-week social distancing order. Once the measure was lifted, infections and deaths started to increase again.

The result was that as the UK’s weekly death count increased, it “drove very different rates of increase, with the UK experiencing a rapidly escalating pandemic, while the US had a later and slower increase.”

In the face, showed him the data, drew a line to death rates and other factors, and said, “Look, we had the pandemic in the US, and we had deaths. We had the pandemic in the UK, and we had deaths. This is how it is.”

The art of medicine
Revisiting the 1957 and 1968 influenza pandemics

The virus emerged in China in the winter of 1957 and spread rapidly worldwide via ships, aeroplanes, and trains. In April, it spiked a major epidemic in Hong Kong, where about 250,000 people were infected, and by June India had seen over a million cases. Shortly afterwards, it made landfall in the UK, and by September outpatient consultations were being reported in England, Wales, and Scotland. General practitioners were

Surely one of these is the happy fiction we promote, that modern medical interventions are safe and effective. We routinely forget that the truth there is relative, not absolute, that even a treatment of choice is simply better than the alternatives of untreated disease or lesser treatments. If physicians do not emphasize to patients at every possible opportunity that we always deal in flawed commodities, we inevitably establish hugely inflated expectations of our powers. Rare adverse effects then explode into catastrophe, and our advice founders at the worst possible times.

A second problem is the substantial difficulty of making an invisible and inconceivable future real, a necessity for effective preventive care. Novelist and cinematographers are far better at this art than are clinicians. Perhaps we should learn from their example. Instead of dealing in principles, lecturing patients on the data and the numbers, medicine can instead communicate an aesthetic facture...

Institute of Evolutionary Medicine (IEM)

A PIECE OF MY MIND

Preventing a Pandemic’s Toll–We’ve Been Here Before

No 2 epidemics are alike: those who practiced medicine in the early days of HIV/AIDS can attest to that. AIDS back then was an ultramarathon; COVID is more a series of exhausting sprints. Even so, history is repeating itself in an uncanny fashion as clinicians struggle once again to convince patients to save their own lives.

Widespread rejection of COVID vaccination has been ascribed to specific contemporary problems: the fraught political climate, an established “anti-vaxx” movement, these vaccines’ novel mechanisms, and their unusually rapid path to market. In the late ’90s, though, the first effective HIV treatments sometimes were met with a very similar reception.

No older HIV doctor will ever forget the watershed year of 1996, when the lifesaving power of specific antiretroviral combinations became clear. With those daily ARV formulas, smokescreened and stuffed, antiretroviral advocates used

Mamelund, AJPH, 2020

EDITORIAL

The Dangers of Ignoring History Lessons During a Pandemic

The global ravages of coronavirus disease 2019 (COVID-19) have directed attention to historical analyses of previous respiratory airborne pandemics, particularly the catastrophic influenza of 1918–1919 (1). Similarities in the epidemiologic characteristics of the 2 diseases left

Mooney, Annals of Internal Medicine, 2021
COVID-19 and the anti-lessons of history

As the outbreak of coronavirus disease 2019 (COVID-19) in China's Hubei province continues and new cases of the disease increase globally,1 there is pressure on historians to show the value of history for policy. How can the past assist in the real-time management of the crisis? What insights can be gleaned from the ongoing epidemic for future disease preparedness and prevention? Looking in the background of these de"jà vu" with the 2003 outbreak of severe acute respiratory syndrome (SARS).2 Citing early estimates of the disease's infectiousness, based on an analysis of the first 425 confirmed cases in Wuhan,2 comparisons have been drawn with the 1918–19 influenza pandemic.3 Although in some respects the outbreak of COVID-19 presents a compelling argument for why history matters, there are problems with analogical views of historical comparisons have...

- Oversimplified looking at the present through the lenses of the past will not work.
- Danger: Historians can also mislead policy, not only inform…
- Analogical view: Constrains our ability to grasp the complex place-and-time-specific variables in the present.
- There is no precedent for some aspects: E.g., the challenges of a vaccination as the exit strategy from a pandemic, etc.
- When the present is viewed through the lens of the past, we typically overlook differences.
Morens/Taubenberger/Fauci, AJPH, 2021

A Centenary Tale of Two Pandemics: The 1918 Influenza Pandemic and COVID-19, Part I

David M. Morens, MD, Jeffrey K. Taubenberger, MD, PhD, and Anthony S. Fauci, MD

Separated by a century, the influenza pandemic of 1918 and the COVID-19 pandemic of 2019–2021 are among the most disastrous infectious disease emergencies of modern times. Although caused by unrelated viruses, the two pandemics are nevertheless similar in their clinical, pathological, and epidemiological features, and in the civic, public health, and medical responses to combat them. Comparing and contrasting the two pandemics, we consider what lessons we have learned over the span of a century and how we are applying those lessons to the challenges of COVID-19. (Am J Public Health. 2021;111:1086–1094. https://doi.org/10.2105/AJPH.2021.306310)


<table>
<thead>
<tr>
<th>Variable</th>
<th>1918 Influenza</th>
<th>2019 COVID-19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infectious Agent</td>
<td>Novel respiratory virus</td>
<td>Novel respiratory virus</td>
</tr>
<tr>
<td>Mechanism of emergence</td>
<td>Host switching</td>
<td>Host switching</td>
</tr>
<tr>
<td>Source of emergence</td>
<td>Wild waterfowl (Anseriformes)</td>
<td>Wild Rhinolophus bat</td>
</tr>
<tr>
<td>Cell receptor</td>
<td>Sialic acids on respiratory epithelia</td>
<td>ACE2 receptor on multiple cells, multiple organs</td>
</tr>
<tr>
<td>Viral preadaptation</td>
<td>Virus preadapted or quickly adapted to human spread</td>
<td>Virus preadapted or quickly adapted to human spread</td>
</tr>
<tr>
<td>Clinical &amp; Pathological Disease</td>
<td>Upper respiratory disease, pneumonia</td>
<td>Upper respiratory disease, pneumonia</td>
</tr>
<tr>
<td></td>
<td>No viremia, no systemic disease</td>
<td>Viremia with systemic disease, vascular damage</td>
</tr>
<tr>
<td>Complications</td>
<td>Secondary bacterial pneumonia, empyema</td>
<td>Secondary bacterial pneumonia less frequent; Multisystem disease</td>
</tr>
<tr>
<td>Pulmonary pathology</td>
<td>Viral pneumonia, DAD, edema</td>
<td>Viral pneumonia, DAD, edema</td>
</tr>
<tr>
<td></td>
<td>Microthrombi, variable hemorrhage in some</td>
<td>Microthrombi, variable hemorrhage in some</td>
</tr>
<tr>
<td></td>
<td>Abluent immune response</td>
<td>Abluent immune response</td>
</tr>
<tr>
<td></td>
<td>Massive neutrophil infiltrates in some</td>
<td>Neutrophil infiltrates less frequent</td>
</tr>
<tr>
<td>Epidemiology</td>
<td>Possible immunity in older persons</td>
<td>Prior immunity status not yet certain</td>
</tr>
<tr>
<td>Preexisting immunity</td>
<td>Case-fatality ratio about 1% in United States</td>
<td>Case-fatality ratio estimated around 1% in United States</td>
</tr>
<tr>
<td>Mortality</td>
<td>Higher mortality in infants, elderly, chronically ill</td>
<td>Children and young adults: lower incidence &amp; severity</td>
</tr>
<tr>
<td></td>
<td>Pregnant women/fetuses</td>
<td>No extreme mortality in pregnant women/fetuses?</td>
</tr>
<tr>
<td>Morbidity</td>
<td>Mortality peak in adults aged 20–40 years</td>
<td>No mortality peak in adults aged 20–40 years</td>
</tr>
<tr>
<td>Origin &amp; spread</td>
<td>Morbidity peak in school-aged children</td>
<td>Low morbidity in children &amp; young adults</td>
</tr>
<tr>
<td>Spread by travel, from big cities, spread outward</td>
<td>Spread by travel, from big cities, spread outward</td>
<td></td>
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<tr>
<td></td>
<td>$R_e$ estimated to be about 1–2</td>
<td>$R_e$ about 1–2, but varies greatly</td>
</tr>
<tr>
<td>Spread by droplet, aerosol, hands and fomites</td>
<td>Spread by droplet, aerosol, hands, and fomites</td>
<td></td>
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<tr>
<td>Asymptomatic carriers</td>
<td>Asymptomatic carriers</td>
<td>Asymptomatic carriers</td>
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<tr>
<td>Super spreaders probable</td>
<td>Induction of full or partial protective immunity not established</td>
<td>Super spreaders</td>
</tr>
<tr>
<td>Induces full or partial protective immunity</td>
<td>Persistence potential not yet established</td>
<td></td>
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<tr>
<td>Persisted by means of viral evolution</td>
<td>Persistence potential not yet established</td>
<td></td>
</tr>
<tr>
<td>Public Health Responses</td>
<td>Closures, isolation, social distancing, masks</td>
<td>Closures, isolation, social distancing, masks</td>
</tr>
<tr>
<td></td>
<td>Bacterial vaccines</td>
<td>Bacterial vaccines, SARS-CoV-2 viral vaccines</td>
</tr>
<tr>
<td>Treatment</td>
<td>Supportive care, plasma therapy, no ICUs</td>
<td>Supportive care, plasma therapy, ICUs</td>
</tr>
<tr>
<td></td>
<td>No antibiotics or antivirals</td>
<td>Antibiotic, antivirals, glucocorticoids</td>
</tr>
<tr>
<td></td>
<td>Quack and untried remedies</td>
<td>Quack and untried remedies</td>
</tr>
<tr>
<td>Psychosocial Reactions</td>
<td>Widespread disease fear</td>
<td>Widespread disease fear</td>
</tr>
<tr>
<td></td>
<td>Common defance of public health recommendations</td>
<td>Common defance of public health recommendations</td>
</tr>
<tr>
<td></td>
<td>Altruism and helping others was common</td>
<td>Altruism and helping others was common</td>
</tr>
</tbody>
</table>

Highlighting similarities and differences!
Our perspective: A careful middle way…

- One can and should “learn” from both similarities & differences with past epidemics.
- Every pandemic takes place again in a new context and is a mix of old/new things, past experiences have to be adapted.
- History offers scenarios and warnings that should at least be considered in pandemic planning (alternative: ignoring the past)
- Not only 1918 is relevant, other past pandemics and epidemics also contain relevant aspects.
- Past pandemic experiences must be researched evidence/source-based (→ research gap in Switzerland)
- Research is only the first step, the transfer of this knowledge is at least as important.
4. Selected **snapshots** from the past with relevance for the present (& the future?)
**NPIs: Tempo matters!**

- 3 similar articles in JAMA and PNAS 2007-2009
- NPIs: School closures, quarantine, ban of gatherings, etc.
- Strong association between early, sustained, and layered application of NPIs and mitigating the consequences of the 1918 pandemic in US cities.

**Table 4. Implementation Strategy of Nonpharmaceutical Interventions for 21 Cities Between September 8, 1918, and February 22, 1919**

<table>
<thead>
<tr>
<th>Outcome Variable</th>
<th>Public Health Response Time, d</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Early (≤7 d)</td>
<td>Late (≥7 d)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>25th Percentile</td>
<td>50th Percentile</td>
<td>75th Percentile</td>
<td>25th Percentile</td>
<td>50th Percentile</td>
</tr>
<tr>
<td>Time to peak, d</td>
<td>13</td>
<td>18</td>
<td>22</td>
<td>9</td>
<td>11</td>
</tr>
<tr>
<td>Magnitude of first peak (weekly EDR)</td>
<td>54.7</td>
<td>67.6</td>
<td>84.8</td>
<td>101.5</td>
<td>125.8</td>
</tr>
<tr>
<td>Excess pneumonia and influenza mortality rate (total EDR)</td>
<td>359.1</td>
<td>451.2</td>
<td>505.2</td>
<td>529.5</td>
<td>590.3</td>
</tr>
<tr>
<td>Total Days of Nonpharmaceutical Interventions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excess pneumonia and influenza mortality rate (total EDR)</td>
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<td>451.2</td>
<td>505.2</td>
<td>529.5</td>
<td>593.3</td>
</tr>
</tbody>
</table>

Abbreviation: EDR, excess death rate.

- Cities that intervened early and sustained had longer time to the peak, lower magnitude of the peak, lower excess deaths.
- Just one of many examples: NPIs work, and tempo matters.
**NPIs: Hesitation and decentralisation are risky**

**Annals of Internal Medicine**

**Public Health Interventions, Epidemic Growth, and Regional Variation of the 1918 Influenza Pandemic Outbreak in a Swiss Canton and Its Greater Regions**

Kaspar Staub, PhD; Peter Juni, MD*; Martin Umer, MD; Katarina L. Matthes, PhD; Corina Leuch, BSc; Gina Gemperle, MD; Nicole Bender, MD, PhD; Sara I. Fabrikant, PhD; Milo Puhin, MD, PhD; Frank Ruhli, MD, PhD; Oliver Gruebner, PhD†; and Joël Floris, PhD‡

Public health interventions implemented during the coronavirus disease 2019 (COVID-19) pandemic are based on ex-

- Reported ILI cases, canton of Bern 1918/19.
- In the 1st wave, school closures & restrictions of mass gatherings were associated with a deceleration of epidemic growth.
- In the 2nd wave, cantonal authorities initially reacted hesitantly and delegated the responsibility to enact
- Similar patterns were found in the management of the COVID-19 outbreak.
Excursus: Warnings at the eve of the fatal second wave 1918

October 8, 1918: The delegated doctor of the city of Zurich in a major newspaper (beginning 2nd fatal wave):

- “The flare-up of the epidemic is primarily favoured by the carelessness of the public, bordering on recklessness, who, having barely escaped the danger, throw all well-meant advice to the wind, whether out of comfort or out of selfishness and pleasure-seeking.”

- “A new wave of the flu epidemic is coming ... hundreds of people may have to pay for their carelessness with their lives tomorrow.”

- “It must therefore be called the duty of every individual to contribute to the containment of the epidemic in his own place, putting aside his own self-interest, and by conscientiously following all that is required.”
A big constant: Individuals of low SEP & minorities are at higher risk

- Individuals of low SES, less affluent neighbourhoods, and racial/ethnic minorities had worse outcomes in the 1918, 1957, and 2009 influenza pandemics.

- Social inequality was already a forgotten factor in pandemic preparedness plans before COVID-19.

- Example of Norway: It took four months during the COVID-19 pandemic before the risk-management plans mentioned social vulnerability in addition to medical vulnerability.
Later waves can be very strong...

- There is a lot of evidence that later waves can be very strong a few years after the actual pandemic year.
- This happened in many countries after 1890, or in 1920.
- Extreme example: Michigan, Jan-Mar 1920 (excess deaths).
- Reasons: Incomplete immunisation? Virus mutations?
If immunisation is too low, dropping temperatures in fall 2021 may lead to epidemic resurgence – as in 1918, 1957 and 2020

- Newly reported cases of ILI and SARS-CoV-2 in the Canton of Bern.

- Scenario 1: In 1918, 1957, and 2020, the onset of the fall waves occurred 0-2 weeks after the first drop in temperatures at the end of September (calendar week 39).

- Scenario 2: Strong later wave in winter 1920, and thereafter milder seasonal waves every 1-2 years.
In utero exposure 1918: A warning from the past?

- Katarina Matthes: Viewpoint accepted in SMW
- Lexis surface plot for annual change in age-specific mortality in Switzerland based on HMD data (adapted from Jones et al. Qual. Quant. 2022)
- Visualisation of **period and cohort mortality** effects (orange/red=increase, blue/green=decrease)
- Diagonal lines represent cohort effects: Birth cohort **1919** (in-utero exposure during the “Spanish flu”) had a higher mortality, esp. from the 1970s (age 50+).
- But also **1818** cohort! Last hunger crisis 1816-1817
- Current work: Look at short- and long-term mortality effects of in utero exposure 1918 in more details.
Institute of Evolutionary Medicine (IEM)

Work in review: (Cross-)Immunity and reinfections

- Key topic in multi-wave pandemics: Immunity and reinfections
- Unnoticed archival source revisited
- Individual responses to medical survey among entire factory workforce in Cossonay (VD) in 1919
- n=820 factory workers, 50.2% reported ILI (majority severe illness)
- **15.3% of ill persons reported reinfections** (increasing rate across waves)
- The majority of subsequent infections were reported to be as severe as the first infection, if not more.
- Illness during the first wave, in the summer of 1918, was associated with a **35.9% (95% CI, 15.7-51.1)** protective effect against infection during later waves.
Is COVID-19 the largest demographic disaster since 1918 in CHE, SWE, ESP?

- History is necessary to contextualise current events
- Only a few countries have continuous monthly mortality data available for longer periods.
- Spain, Sweden, and Switzerland were militarily neutral and not involved in combat during both world wars.
- We show that in 2020, these countries recorded the highest aggregated monthly all-cause excess mortality since the 1918 influenza pandemic.
- For Sweden and Switzerland, the highest monthly spikes in 2020 almost reached those of January 1890.
- These findings emphasize the historical dimensions of the ongoing pandemic.
Fall 2021: Strongest excess mortality in Switzerland since 1918. Historic event!

But: 1918 is still a different dimension, also because of the age groups affected.
Federal Councillor Ignazio Cassis, 17.2.2022: "So the history of epidemics repeats itself. I read recently about the Spanish flu, what happened in our country, it's incredibly topical."

Transfer to the policy makers: Historical dimension seems to be recognised…

But then again… 26.4.2022
Pandemic preparedness and planning prior to COVID-19

- The challenges of subsequent waves are not well elaborated in the Epidemic Act (2016) and Swiss Influenza Pandemic Plan (2018).

- The pandemic plan is outlined for a single-wave influenza pandemic, and the historical horizon reaches back to 2009…
And now: Interest in past pandemics is decreasing again

To the Editor

Humans tend to place present events in the context of past experiences, especially during crises, when society’s vulnerabilities become apparent in these times. Reflection on the learning processes from the past is initiated. All non-pharmaceutical public health countermeasures currently being taken against the COVID-19 outbreak are based on experiences gained from past pandemics over the last several centuries, which were mostly caused by influenza (1889/90, 1918/19, 1957-59, 1968-70, 1977/78, and 2009) and twice by coronaviruses (2003 and 2019/20). Among these pandemics, the 1918/19 influenza outbreak (Spanish flu) remains the most devastating, as it caused an estimated 20-100 million deaths worldwide and continues to exemplify the worst-case scenario.

Over the last few months, during the current worldwide COVID-19 outbreak, we have noted an unprecedented and sharp increase in the public and scientific interest toward the influenza outbreak of 1918/1919. A first look at the Google search trends since 2004 revealed marked increases in searches for Spanish flu on the web and in newspapers in March and April 2020 (Figure 1A). Further, according to a non-systematic PubMed search using the tool PubMed by Year (https://esperr.github.io/pubmed-by-year/), the number of listed scientific studies per 100,000 citations using the search terms Spanish flu or influenza 1918 in their abstract/title reached an all-time high in 2020 (Figure 1B). Of the 31 studies that were published in 2020, some can still be attributed to the centenary of the Spanish flu. However, the number of studies explicitly

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5. Looking ahead to the next pandemic: How can these past pandemic experiences and scenarios be made more present?
Target groups (identified using personas)

- **Scientists & students**: Access to data and background information
- **Data journalists**: Access to data and background information
- **Authorities & politicians**: More information about past experiences
- **The public**: More information about past experiences
“Lack of access to historical epidemiologic data constrains scientific understanding of the dynamics of disease transmission, hampers disease-control programs, and limits public health education programs. We believe that open access to large disease surveillance data sets in computable form should become a worldwide norm.”

(van Panhuis et al., NEJM, 2013)
https://www.tycho.pitt.edu
Digitizing large amount of historical data
Future work: Individual death register data 1837, 1890, 1918…
LEAD Data & Visualisation Hub

Collaboration with ZHAW (DIZH)
- ORD Data Hub: Infectious diseases, mortality, health
- Meta data & limitations are important!
- Collaboration with FSO
- Tech. Details: Zenodo, YAML, PX-Format, FLASK-Python, PostgreSQL, HTML, CSS, Java, etc.
- Selected interactive data stories written by ZHAW experts
- Go live in Spring 2023, continuously expanded afterwards
Examples of data series…

- Childhood diseases and vaccination across the 20th century

- Weekly death counts for the largest 8 Swiss cities 1890s-1960s
Excess mortality (age, sex) per districts 1890, 1918, 2020 (INLA, GI*)
Reconstruction Cholera Outbreak Basel 1855

Late July to end of September 1855
399 people infected, 205 died
Determinants of neonatal health in Lausanne, 1905-1925

- Approx. 15,000 births (ca. 50% complete)

- Among other determinants: ILI infection during pregnancy

- 2 PhD students, 1 Postdoc

Extensive documentation, incl. health history & infection status in pregnancy 1918 and 1919 (35% reported infection)
6. Interdisciplinarity is important
Pandemic courses vs. narratives in newspapers

- Collaboration: Computational Linguists / Digital Humanities

- Pilot study \textit{(under review): Reconstructing pandemic narratives} in ca. 2000 newspaper articles in Bern 1918, using text mining methods:
  - Temporal overlap with epidemiological data
  - Narratives change across waves
Adding genetics (aRNA) to the picture

- Did pandemic viruses also changed during past multi-wave pandemics?
- aRNA very volatile; new methods to isolate genomes from formalin-fixed samples.
- Consortium published 3 European 1918/19 genomes: Virus changed (nucleoprotein sites, associated with host antiviral response).
- IEM Zürich: Successful extraction of a 1918 genome (30x coverage depth, >90% genome), publication currently been written.
7. Conclusion
Conclusion

- Experience with recent and more distant epidemics / pandemics can inform present and future pandemic planning.

- History never repeats itself, but the past offers scenarios & warnings to be adapted to a new challenge & context.

- The past must be systematically analysed, in an interdisciplinary way and combining quantitative & qualitative approaches.

- Knowledge transfer and science communication are crucial.

- What would be the alternative: ignore the past and repeat mistakes?
Thank you!

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