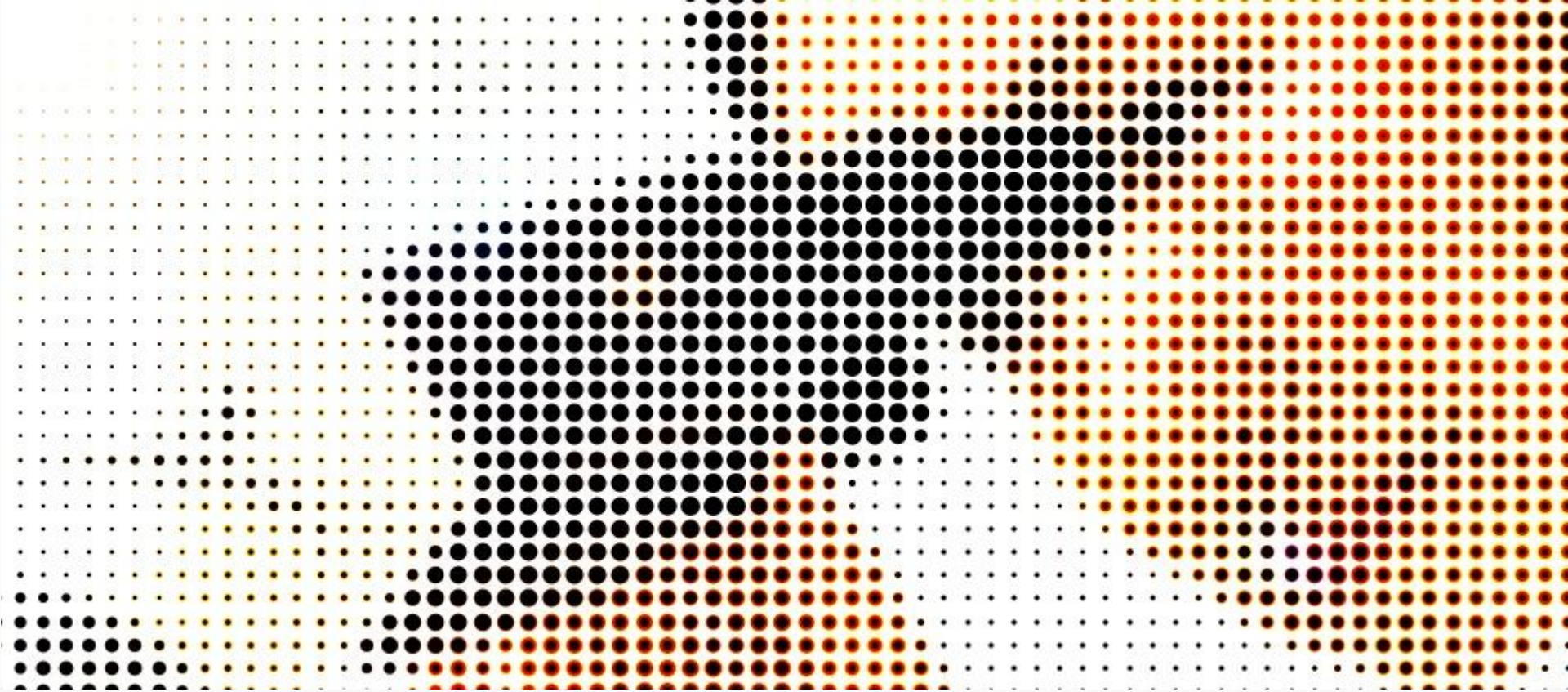


Pandemic Exposure in Health Insurance

Herbert Meister

Date: 08/06/2010

- Important to know about Pandemic
- Health Insurers Risk
- Exposure Model



Important to know about Pandemic

Important to know about Pandemic

Definition and Characteristics

- Pandemic is an epidemic of an infectious disease spreading through human populations across a continent or world-wide

Epidemic occurs when new cases of a certain disease, in a given human population, and during a given period, substantially exceed what is "expected," based on recent experience

- A widespread endemic disease with stable incident rates is not a pandemic
- A disease is not a pandemic merely because it is widespread or kills many people. It must also be infectious

Important to know about Pandemic Influenza Pandemics in later History



1918-1920
„Spanish flu“
A (H1N1)
-Avian Flu-

Ca. 20-40m deaths



1957-1958
„Asian flu“
A (H2N2)
-Reassortant-

Ca. 1.5m deaths



1968-1969
„Hong Kong flu“
A (H3N2)
-Reassortant-

Ca. 0.75-1m deaths

Important to know about Pandemic

More Global Pandemics

Time	Pandemic	Agents	Comment
165-180	Antonine Plague	Virus evtl smallpox	Killed 25% of the infected (approx 5 millions)
251-266	Plague of Cyprian	Virus evtl. Smallpox	Caused manpower shortage in agriculture and Roman army
541-750	Plague of Justinian	Bacterium Bubonic plague	Caused drop of European population by 50%.
1300s	Black Death Bubonic plague	Bacterium Bubonic plague	Estimated 75 Million death. Within a 6 year period 20-30 Million Europeans died
1501-1587	Typhus	Bacterium	
1732-1733	Influenza	Virus	
1775-1776	Influenza	Virus	

Important to know about Pandemic

More Global Pandemics

Time	Pandemic	Agents	Comment
1816-1826	Cholera	Bacterium	
1829-1851	Cholera	Bacterium	
1847-1848	Influenza	Virus	
1852-1860	Cholera	Bacterium	
1855-1950	Bubonic Plague	Bacterium	Started in Central Asia, Pune in India was severely affected
1857-1859	Influenza	Virus	
1863-1865	Cholera	Bacterium	
1889-1892	Influenza	Virus	
1899-1923	Cholera	Bacterium	

Important to know about Pandemic Current Pandemics

- HIV since 1980s (Virus)
- Swine Flue (H1N1 influenza virus) since 2009
 - At least 18000 reported death (8300 USA and 4900 Europe, 4800 rest of the world)

Important to know about Pandemic Outlook

Potential future threats

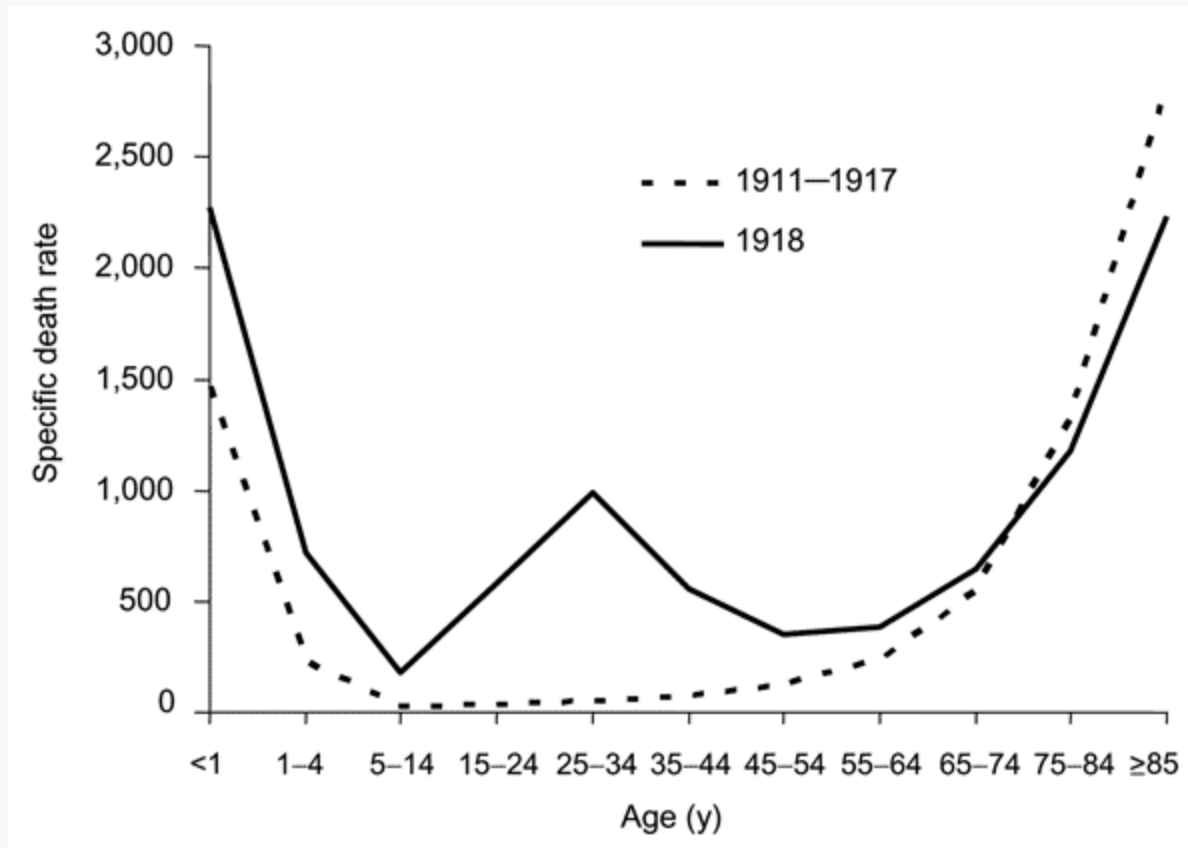
- Viral hemorrhagic fevers (Lassa fever, Rift Valley fever, Marburg virus, Ebola virus, Bolivian hemorrhagic fever). Currently the virus ability to spread efficiently enough through human population is limited
- Antibiotic resistance: threat from multi drug resistant TB agent (India and China), plague bacterium yersinia pestis. Common bacterium's have developed resistance to whole classes of antibiotics in the last 20 years
- SARS. SARS/atypical pneumonia has not been eradicated and could re-emerge
- Influenza/H5N1 (Avian Flue). 2004 the virus was detected in birds in Vietnam. New variants of the virus could be both highly contagious and highly lethal

Important to know about Pandemic Characteristics of an Influenza Pandemic

- **Severity**

- Incubation period: 4 days or less (except H5N1)
- Infection Rate (=attack rate): 20%-40% of population (seasonal 10%-15%)
- Case mortality rate: 0.5% (seasonal 0.05%-0.1%)
 - Spanish Flue (2.5%-5%)
 - Age specific pattern

Important to know about Pandemic Lethality per age group (1918 Influenza)



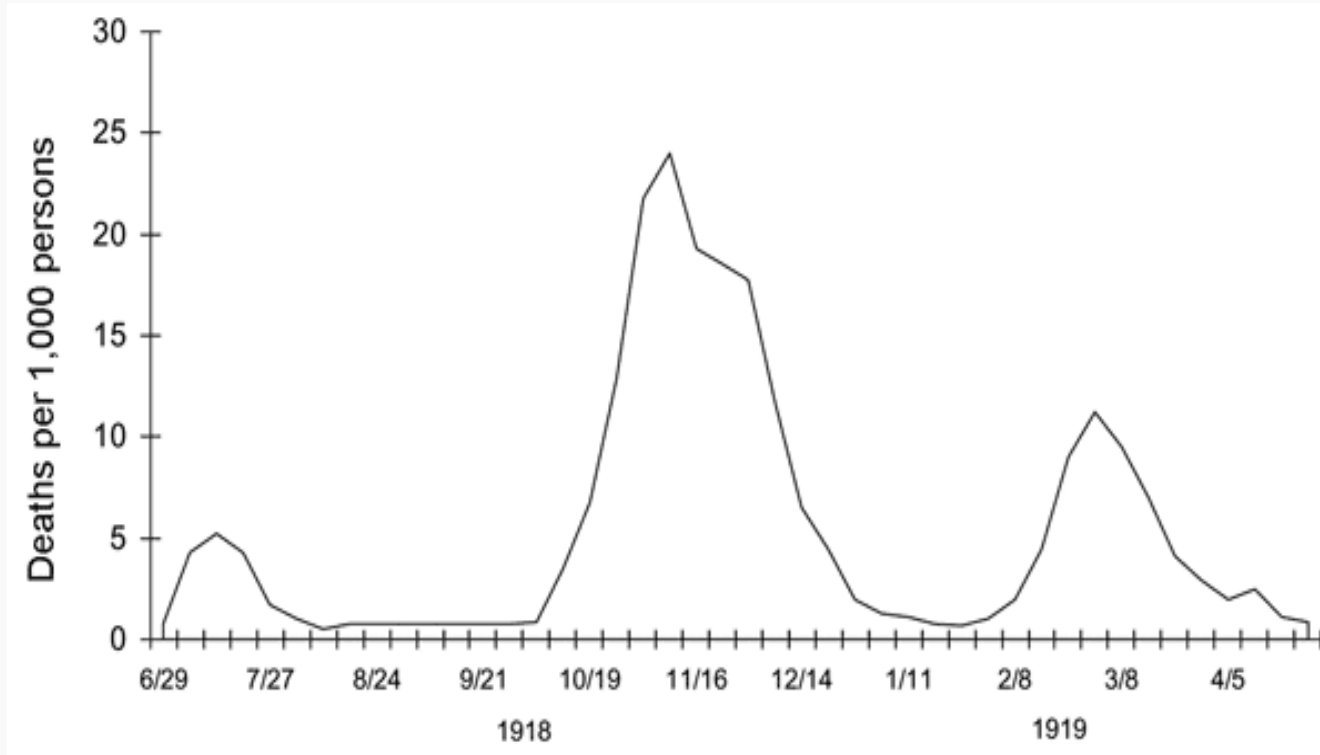
- Source: CDC
- U&W-" shaped combined influenza and pneumonia mortality, by age at death, per 100,000 persons in each age group, United States, 1911-1918. Influenza- and pneumonia-specific death rates are plotted for the interpandemic years 1911-1917 (dashed line) and for the pandemic year 1918 (solid line)

Important to know about Pandemic Characteristics of an Influenza Pandemic

- **Spread and Timing**

- Seasonality: Northern Hemisphere (fall, winter, spring)
- Outbreak type: Multi Regional epidemic (enhanced by international air travel or one front moving across the globe)
- Spread time: 6-9 month (conservative assumption)
- Duration: 12-24 month (seasonal 3-5 month)
- Waves: 2-3 waves separated by one to several month
- Peak duration: 1-2 weeks

Important to know about Pandemic Lethality waives (1918 Influenza)



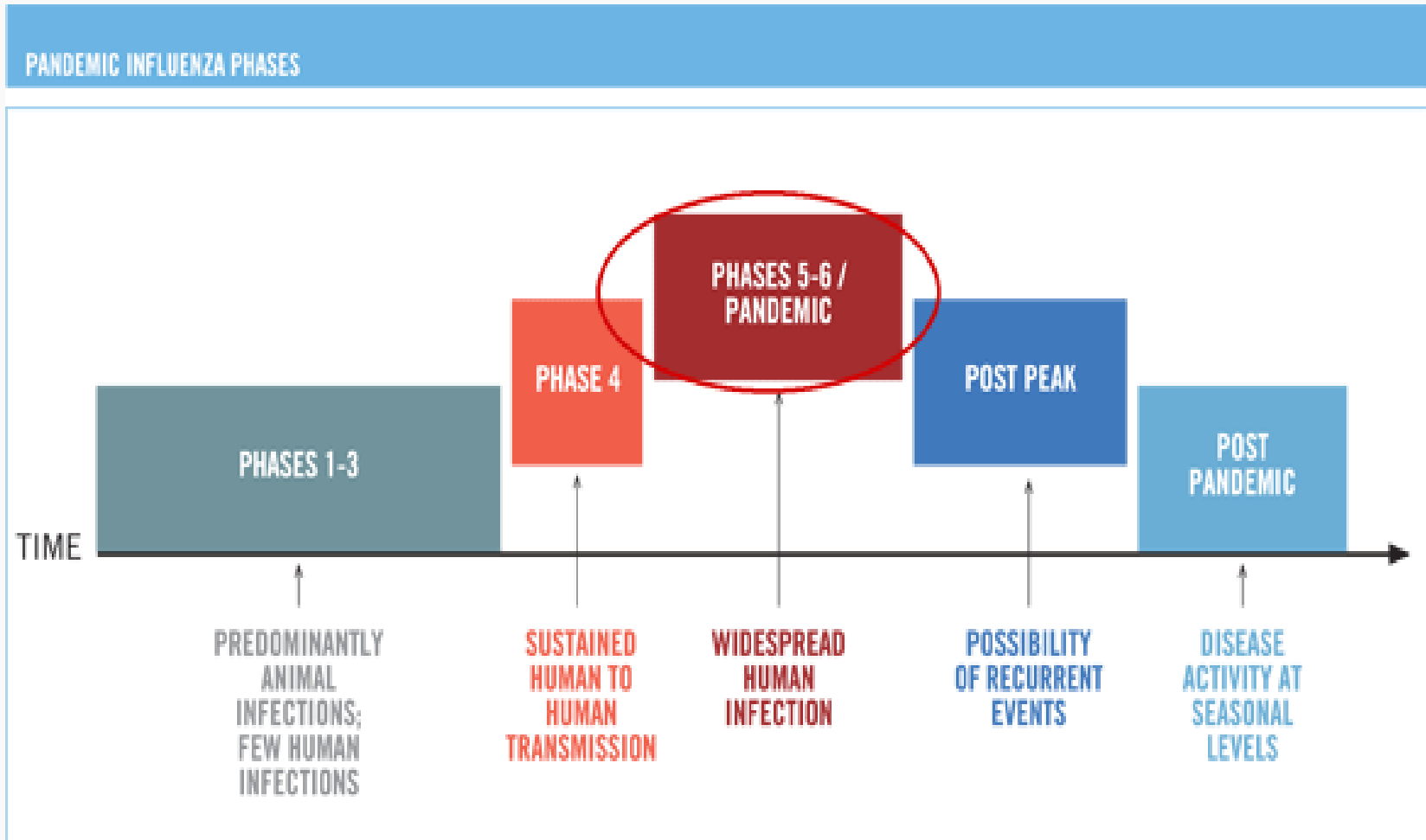
- Source: CDC
- Three pandemic waves: weekly combined influenza and pneumonia mortality, United Kingdom, 1918–1919

Important to know about Pandemic

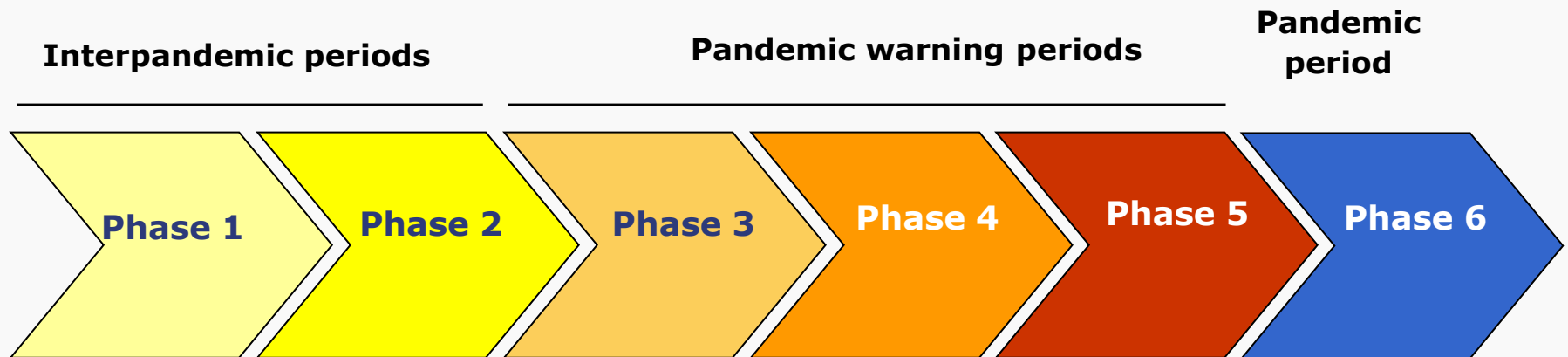
Can it happen again?

Mitigating factors	Risks
Improvement in medical care & technology: Vaccines, anti-viral drugs	Evolution goes on! New strains of agents with increased fatality rate and capability to spread quickly are not unlikely
Global surveillance, e.g. by WHO, CDC	High mobility(global air travel/trains, cars, etc.)
Crisis/emergency preparedness plans, e.g. close-down of central airport hubs (models) and/or mass vaccination	“Megacities” / Areas with high population density (high migration)
Self-limiting nature of most flu epidemics	Vaccine/drug shortage or shortage of medical resources and provider beds
Improved socio-economic environment incl. hygienic conditions	

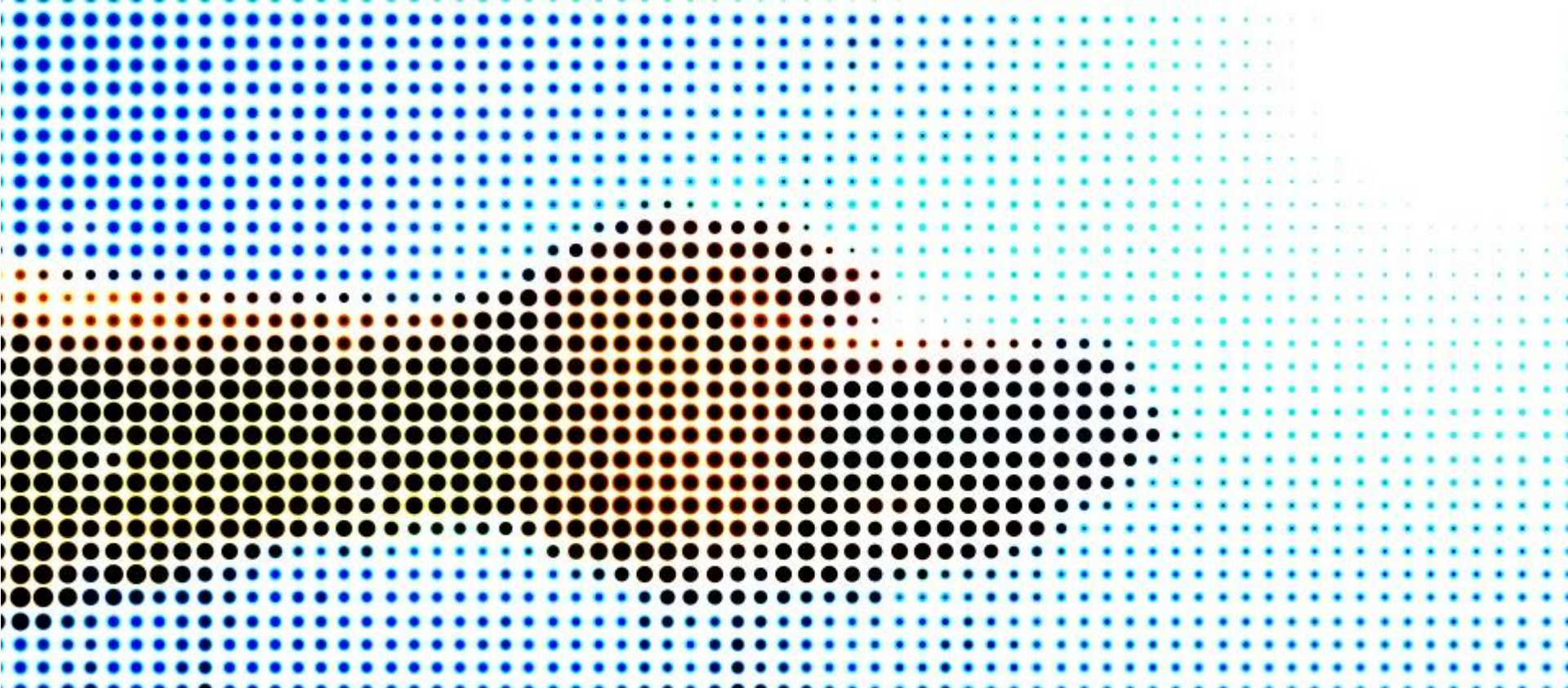
Important to know about Pandemic WHO Influenza Pandemic Warning Levels



Important to know about Pandemic WHO Influenza Pandemic Warning Levels



- | | | | | | |
|--|---|--|---|---|--|
| <ul style="list-style-type: none"> ▪ No evidence of new influenza virus subtypes in humans. ▪ The risk of infection in humans is classified as low. ▪ Action: Preparation stage on global, regional and national level | <ul style="list-style-type: none"> ▪ No evidence of new influenza virus subtypes in humans. ▪ Influenza virus subtypes in animals pose a significant risk for humans. ▪ Action: Minimize risk that virus infects humans. Recognize and record such cases quickly. | <ul style="list-style-type: none"> ▪ Human(s) infected with new influenza virus subtype. ▪ Only isolated cases of human-to-human transmission. ▪ Action: Characterize new virus subtypes quickly. Processes for recording and reaction should be set | <ul style="list-style-type: none"> ▪ Small cluster(s) with limited human-to-human transmission. ▪ Spatial spread is still very limited. ▪ Action: Virus spreading of the virus should be slowed down to win time for developing vaccine, etc. | <ul style="list-style-type: none"> ▪ Large cluster(s) with human-to-human transmission. ▪ Spatial spread is still limited. ▪ Action: Maximize efforts made in Phase 4 to avoid Pandemic or at least win more time | <ul style="list-style-type: none"> ▪ Growing and persistent human-to-human transmission throughout the population. ▪ Global pandemic risk ▪ Action: Minimize impact of the global pandemic |
|--|---|--|---|---|--|



Health Insurers Risk

Risk from Health Insurers point of view

Insurance Risk

- Insurance Risk
 - Underwriting risk: Insured population may be higher exposed due to age, gender, geographical, occupational distribution of the portfolio
 - Pricing Risk: Inadequate assumptions on incident rates for hospitalisation and ICU, length of stay in hospital and ICU, consultation and medication rate, absenteeism rate and length, inadequate assumptions on medial expenses
 - Economic Environment Risk/Policyholder Behaviour Risk: lapse rates, disclosure behaviour of insureds' and clients may change

Risk from Health Insurers point of view

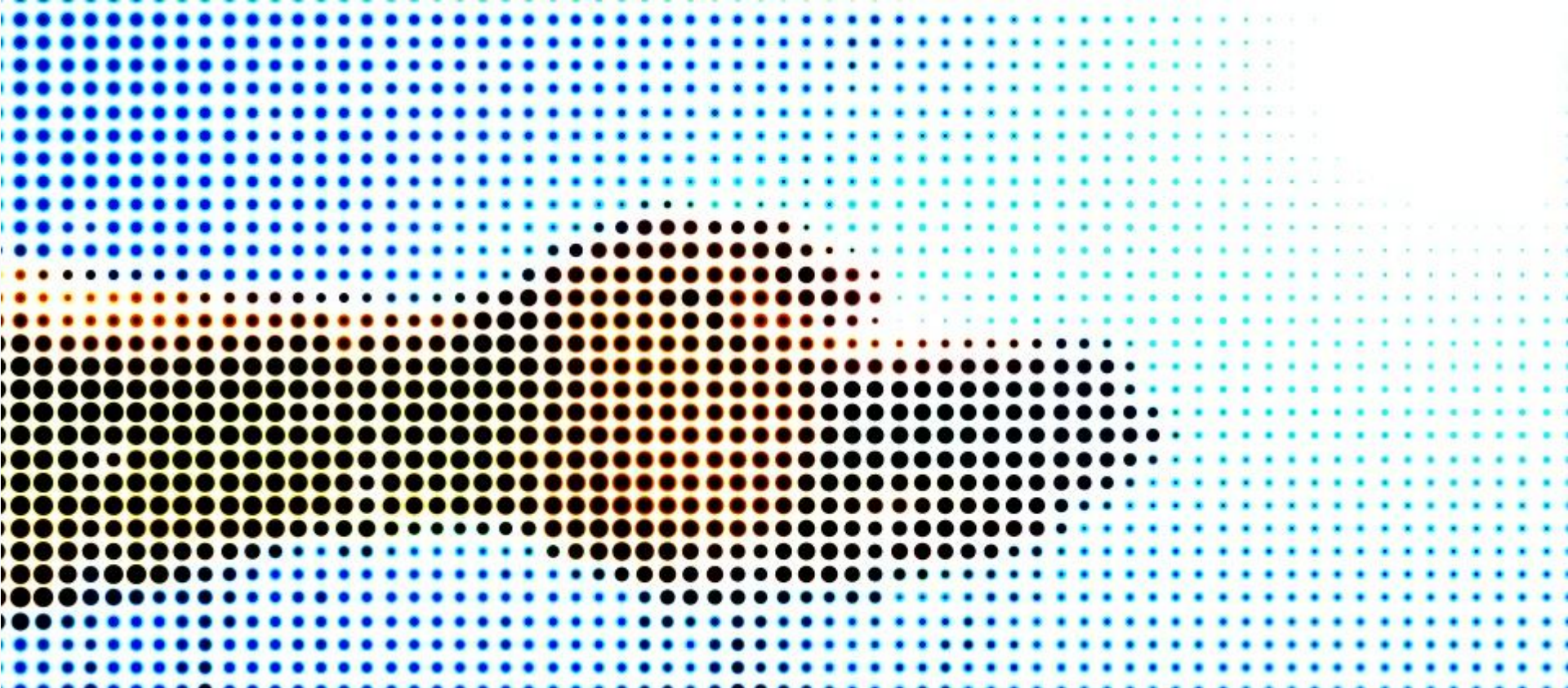
Operational Risk

- Operational Risk
 - Business Risk: Unexpected change in volumes
 - Event Risk:
 - Increased fraud and errors at the time of claims settlement
 - Increased risk of system interruptions due to absence of key support staff
 - Increased risk of changes in the legal environment or insurance supervision affecting the Insurance company

Risk from Health Insurers point of view

Asset Risk

- Asset Risk
 - Equity Shares
 - Bonds ...



Exposure Model

Exposure Model

Dimensions

- Benefit/Product Type
- Type of coverage
- Geographical Scope of coverage
- Currency (Premium/Claims)
- Age
- Policy Exclusion/Limitations
- Legal/Regulatory framework

Exposure Model

Dimensions: Benefit/Product Type

- Lump Sum Based
 - Hospital Cash
 - Surgical Lump Sum
 - PA type of products
 - Short term disability
 - Dread Disease
- Reimbursement
 - Inpatient
 - Outpatient incl medication
 - Outpatient excl medication
 - Travel Health

Exposure Model

Dimensions: Type of Coverage

- First Dollar business
- Excess/Co-insurance/supplementary coverage
- Proportional Coinsurance/Reinsurance
- Non-Proportional Coinsurance/Reinsurance

Exposure Model

Dimensions: Geographical Scope of Cover

- Local only
- Worldwide excl North America
- Worldwide

Exposure Model

Dimensions: Policy Exclusions

- Pandemic risk included or excluded
- General waiting periods applicable
- Annual limits applicable

- National Pandemic plans in place with expected impact on incident rates, costs.
 - For instance all pandemic cases to be treated in certain public sector hospitals only, daily costs are fixed, etc.

Exposure Model

Scenario dependent assumptions

- Hospitalization/ICU rate due to Pandemic
- Length of stay in hospital/ICU due to Pandemic
- Consultation rate due to Pandemic
- Medication rate due to Pandemic
- Absenteeism rate (short term disability)
- Absenteeism length (short term disability)
- Attack rate

Exposure Model

Scenario independent assumptions

- Daily hospitalisation costs
- Daily ICU costs
- Consultation costs
- Medication costs

Exposure Model

Sample assumptions on H1N1

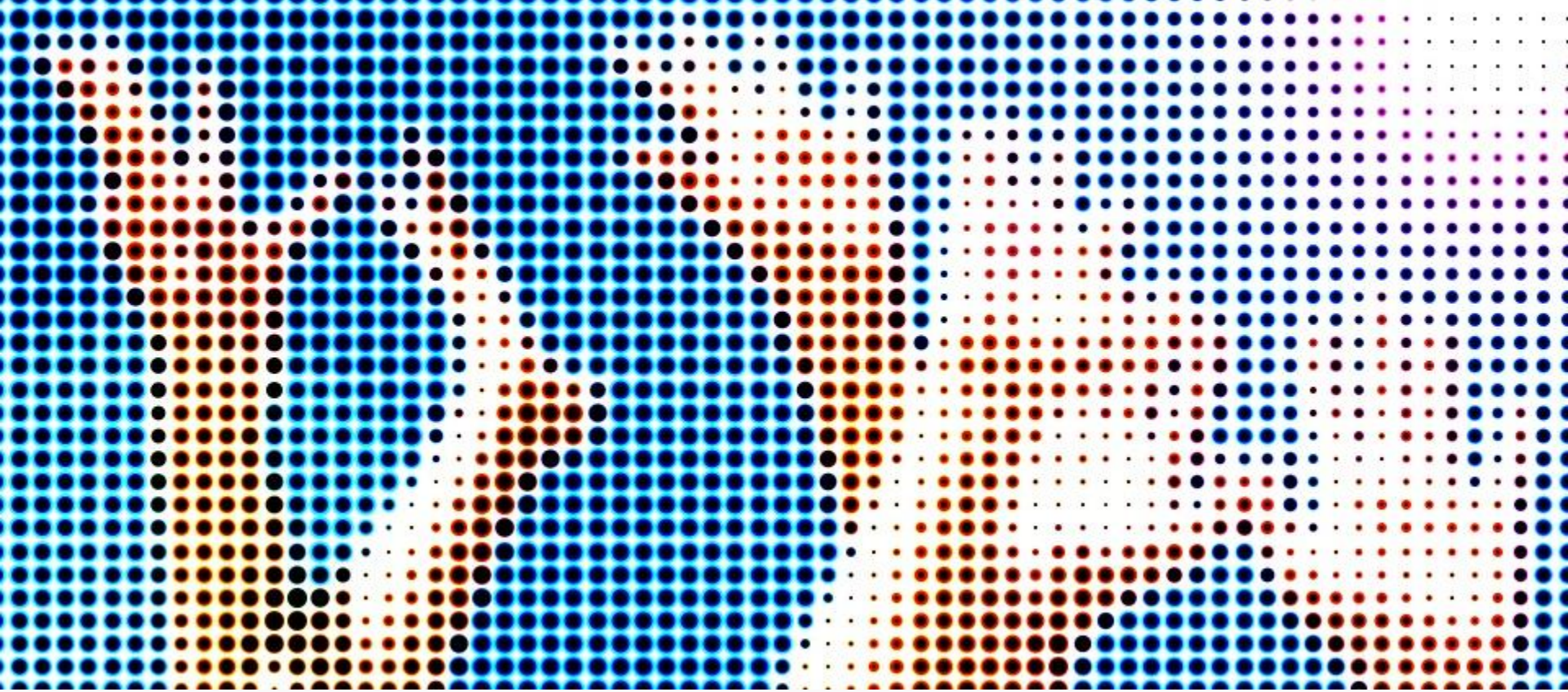
National Pandemic Plans do assume basic parameters for Swine Flue. Assumptions from Norway/ UK:

Parameter	Range	Assumption
Proportion of patient contacting a General Practitioner	10%-30%	20%
Average Duration of Illness	4-10 days	7 days
Proportion of patients getting anti-viral drugs	10%-30%	15%
Proportion of Patient getting admitted to hospital	0.3%-1.0%	0.6%
Average duration of stay in hospital	3-7 days	5 days
Intensive Care Ratio		25% of hosp cases
Lethality	0.01% - 0.1%	0.05%
Peak absence rate		12% of workforce

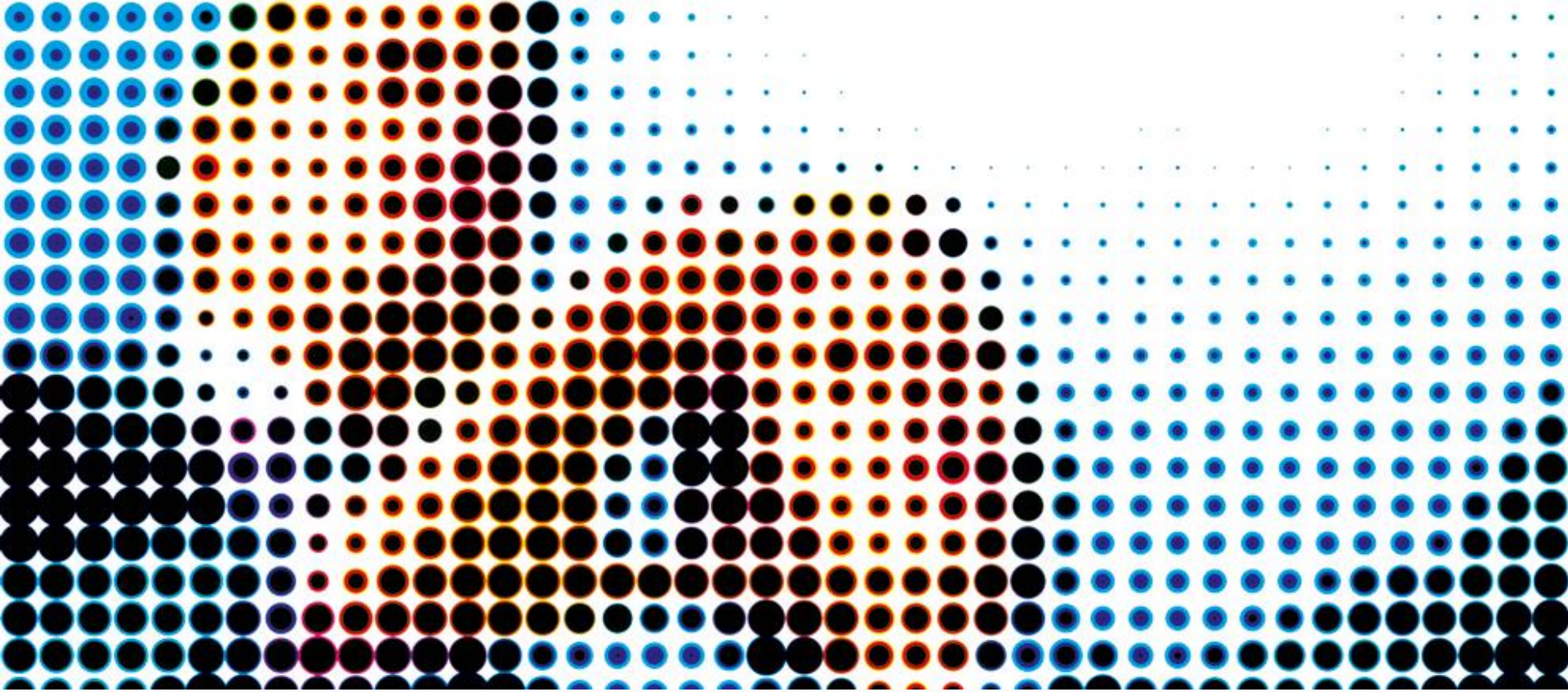
Source: ECDC

Exposure Model Measures

- Annual exposed to insurance risk population
- Average Sum Insured (in case of lump sum products)



Questions and Comments?!



Thank you very much for your attention.

Herbert Meister