İnfluenza Epidemiyolijisi

Dr. Ali Acar

Dışkapı Eğitim Araştırma Hastanesi

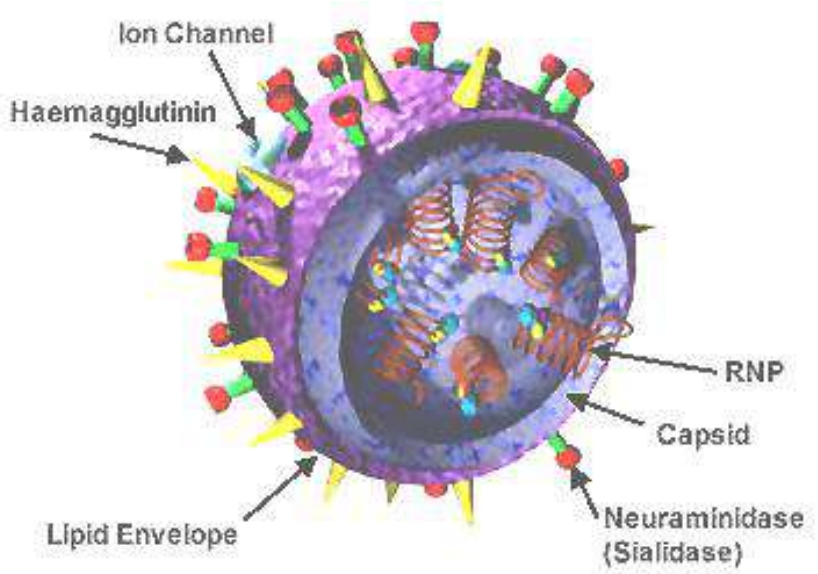
Enfeksiyon Hst. ve Kl. Mik.

İnfluenza

“Değişen bir virüsün neden olduğu değişmeyen bir hastalık”

Edwin D. Kilbourne

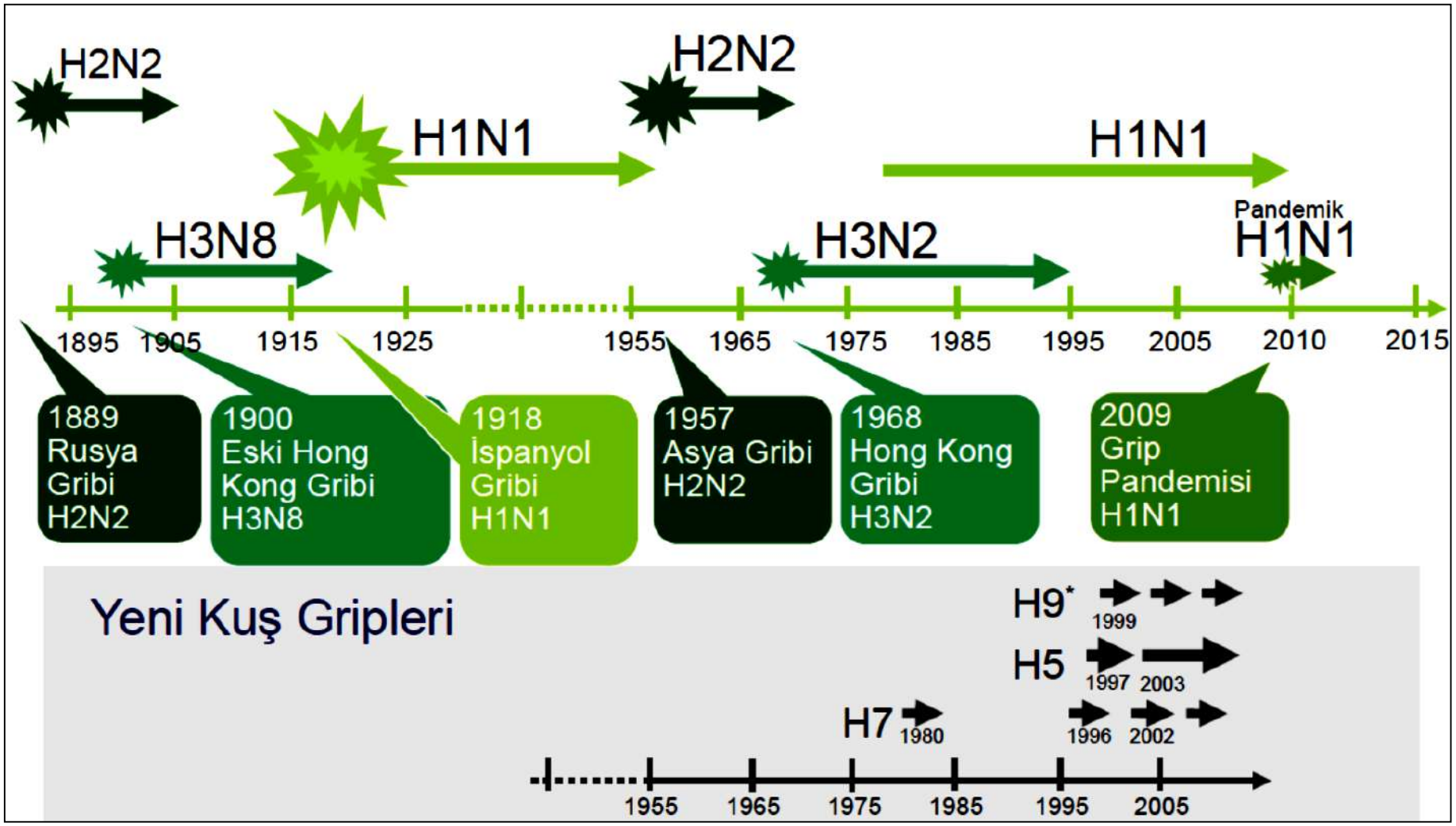
- Ortomiksoviridae ailesinden
- Zarflı RNA virusu
- 4 farklı tipi mevcut:
  - A,B,C,D
    - A konak spektrumu geniş
    - B sadece insanda
    - C insan ve domuzda
    - D domuz ve sığırlarda



Dolaşımdaki viruslar

- İnfluenza A
  - A (H1N1)
  - A (H3N2)
- İnfluenza B
  - B/Yamagata
  - B/Victoria

1895-2010 Grip pandemileri



İnfluenza pandemileri

Yıl	Glikoprotein yapısı	Pandemi şiddeti	Ölüm
1889	H3N2	Orta	?
1918	H1N1 (“İspanyol")	Ağır	20-100 milyon
1957	H2N2 ("Asya")	Orta	1 milyon
1968	H3N2 ("Hong Kong")	Hafif	1 milyon
2009	H1N1	Hafif	+ 36.000

İspanyol gribi-1918

İspanyol gribi-1918

Dünya nüfusu yaklaşık **1,6 milyar**

1. Dünya Savaşında ölen sayısı yaklaşık **8,5 milyon**

İspanyol gribinden ölen sayısı **40 MİLYON**

Approximate beginning of the epidemic, 1918

before sept. 14	between sept. 14 - 21	between sept. 21 - 28	between sept. 28 - oct. 5	after oct. 5

Source: America's Forgotten Pandemic - The Influenza of 1918 - 1989

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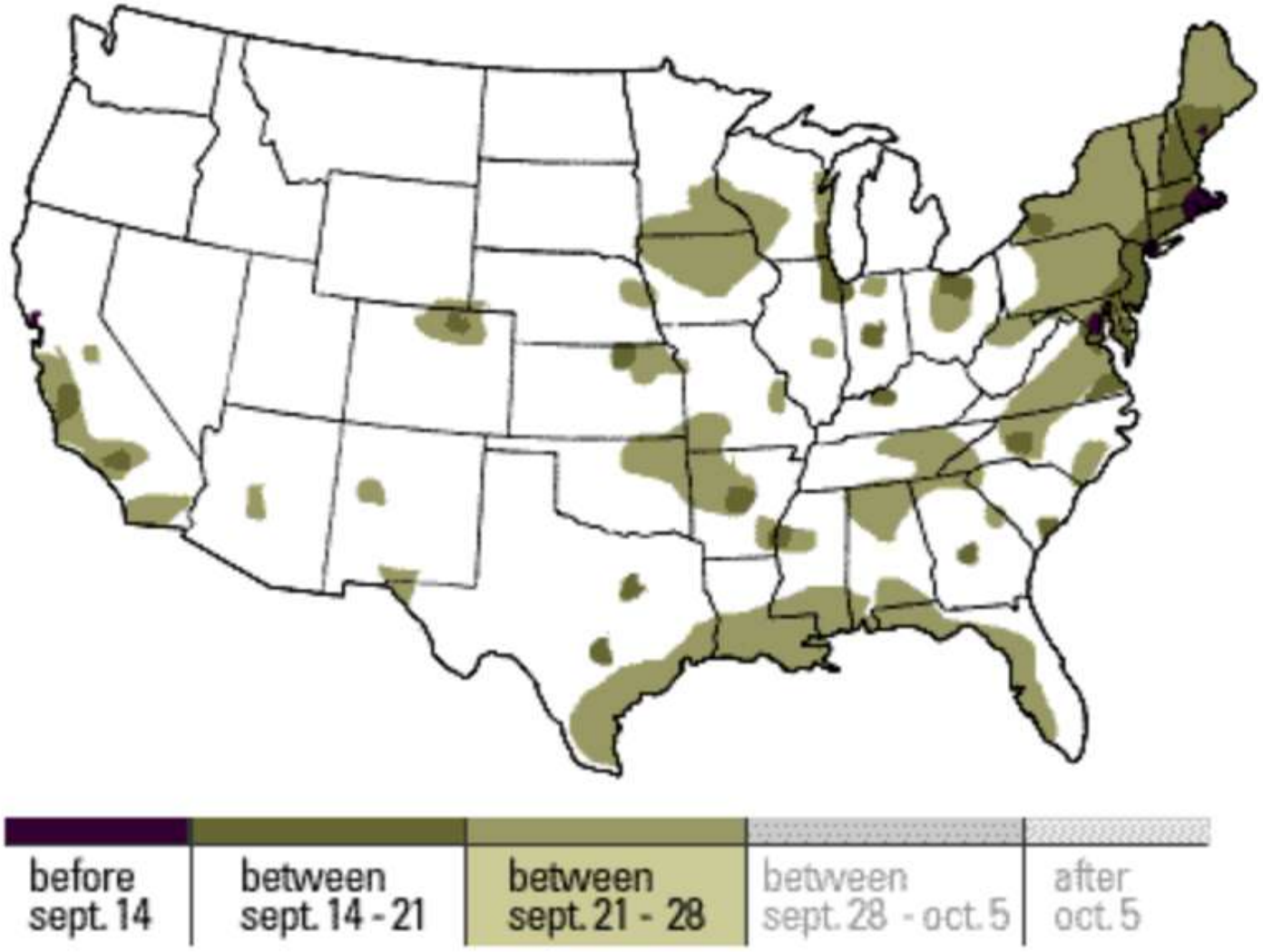

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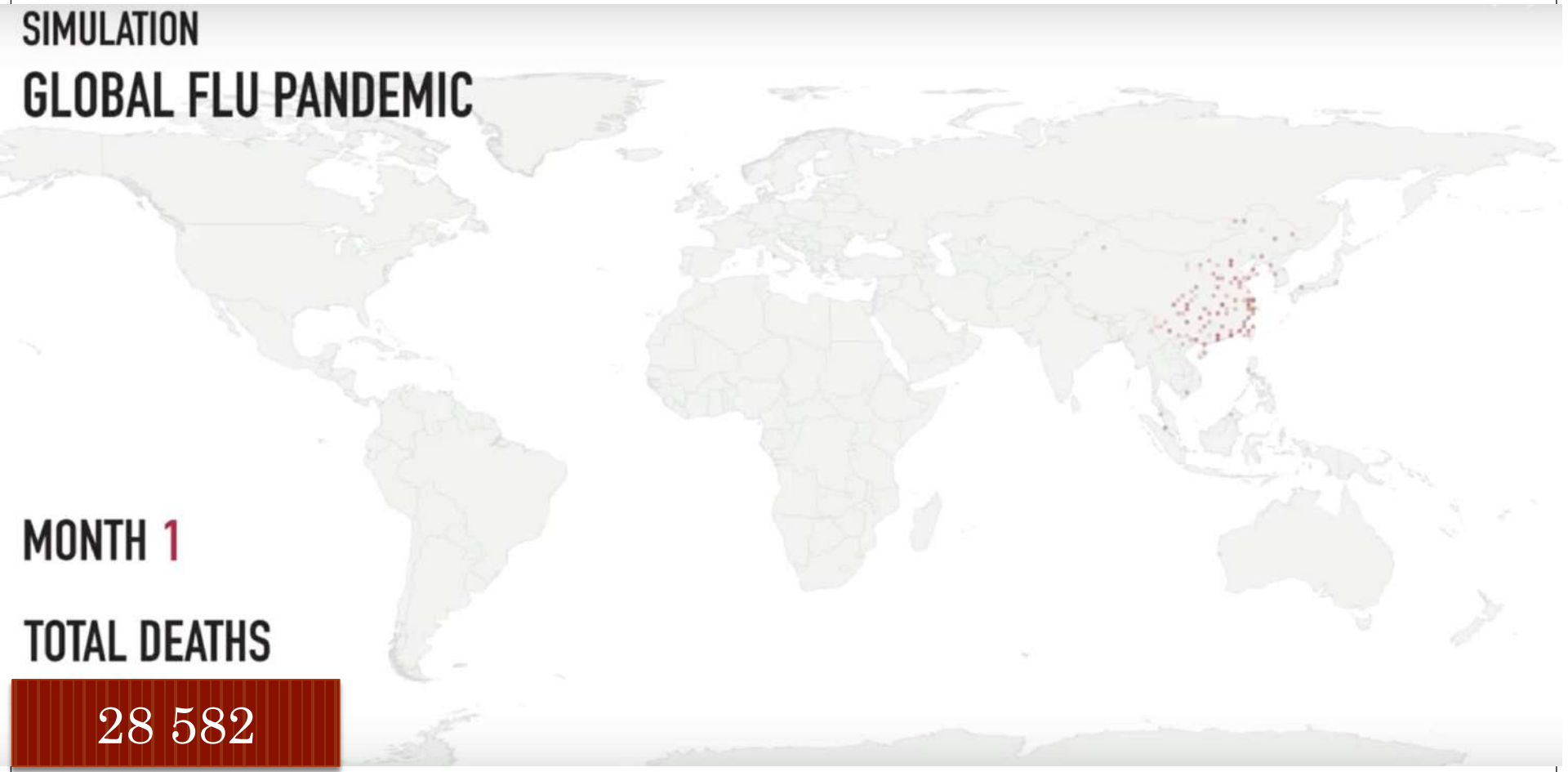
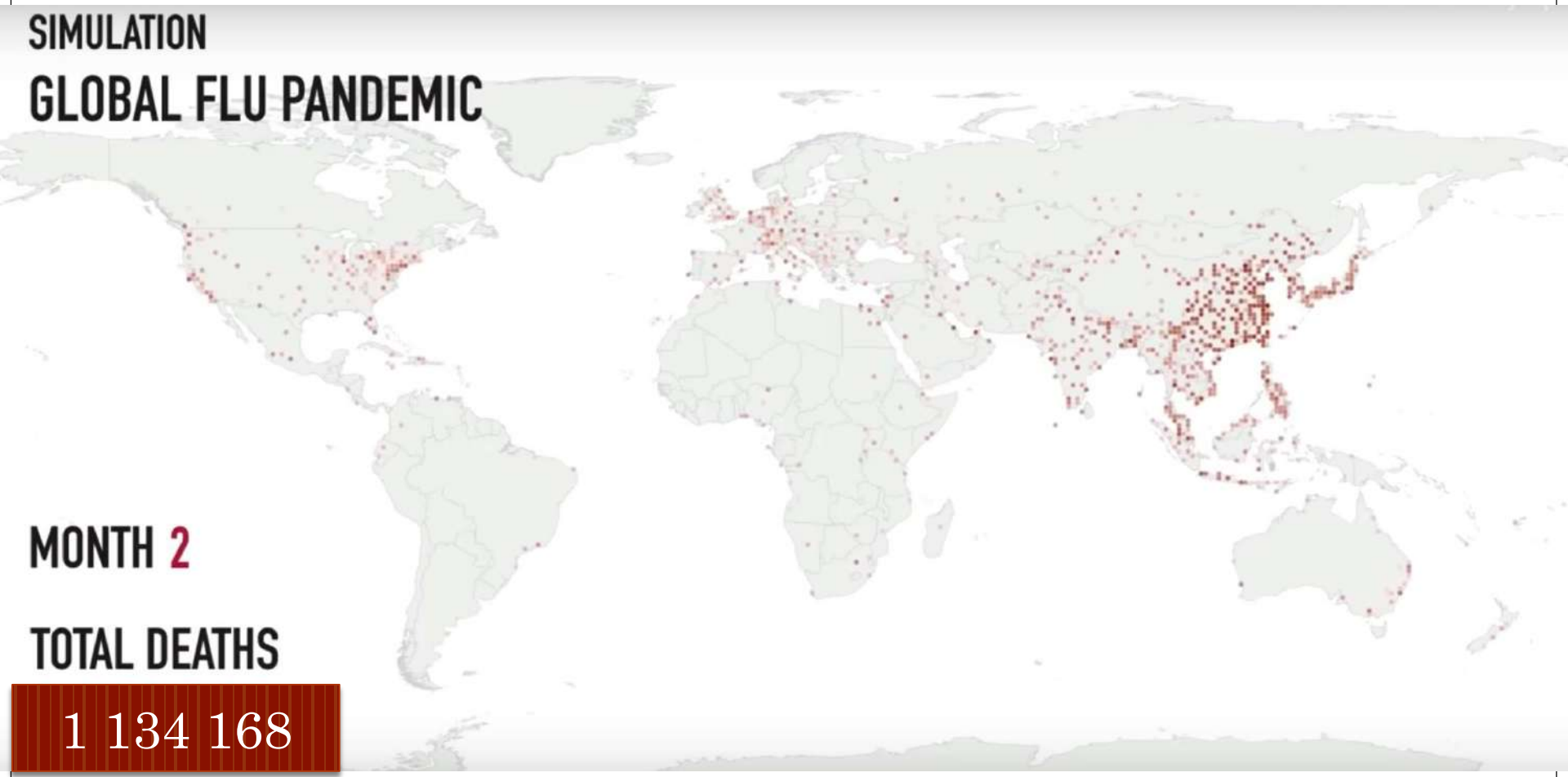


GatesFoundation/Institute of Disease Modeling



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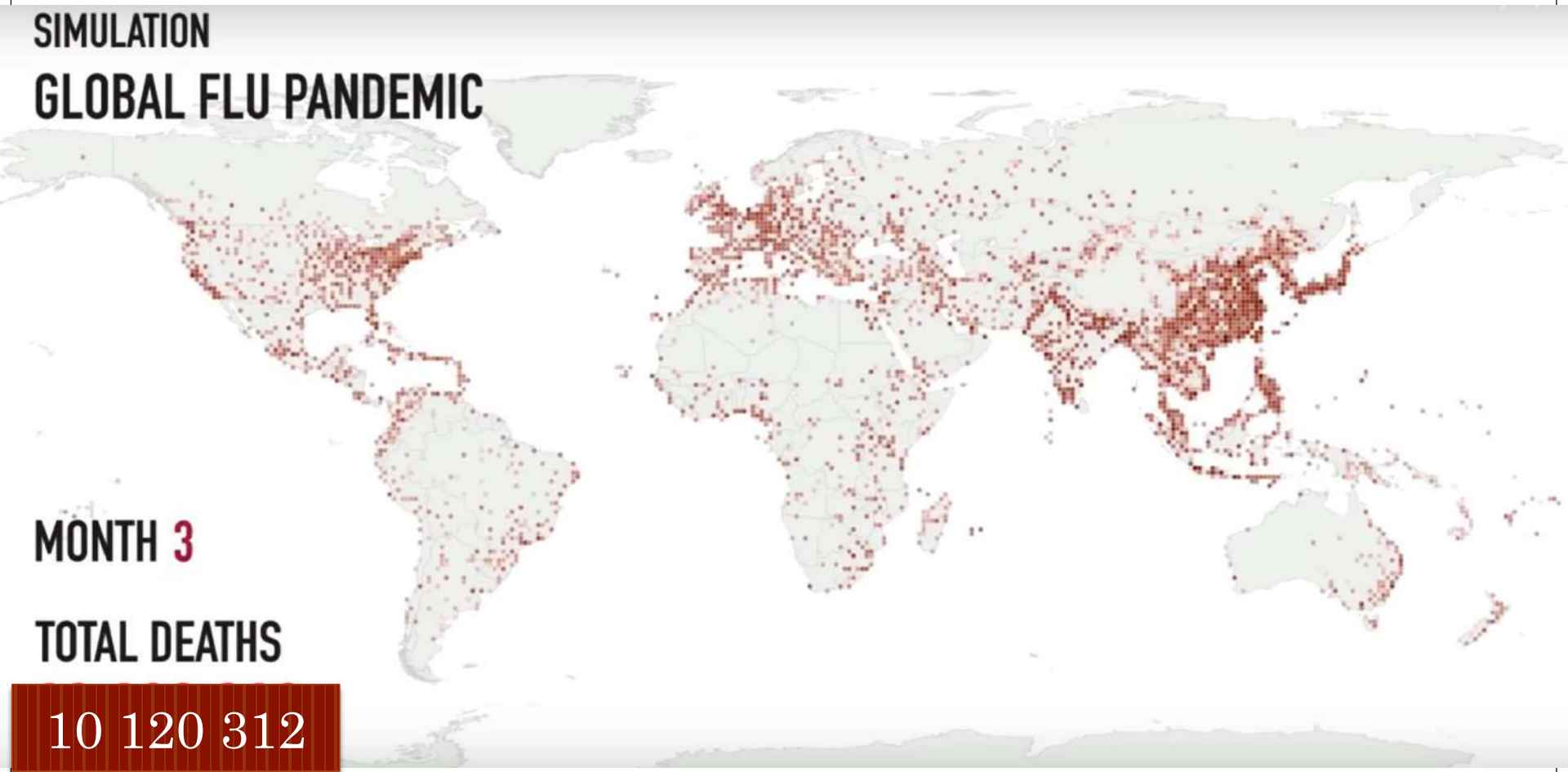

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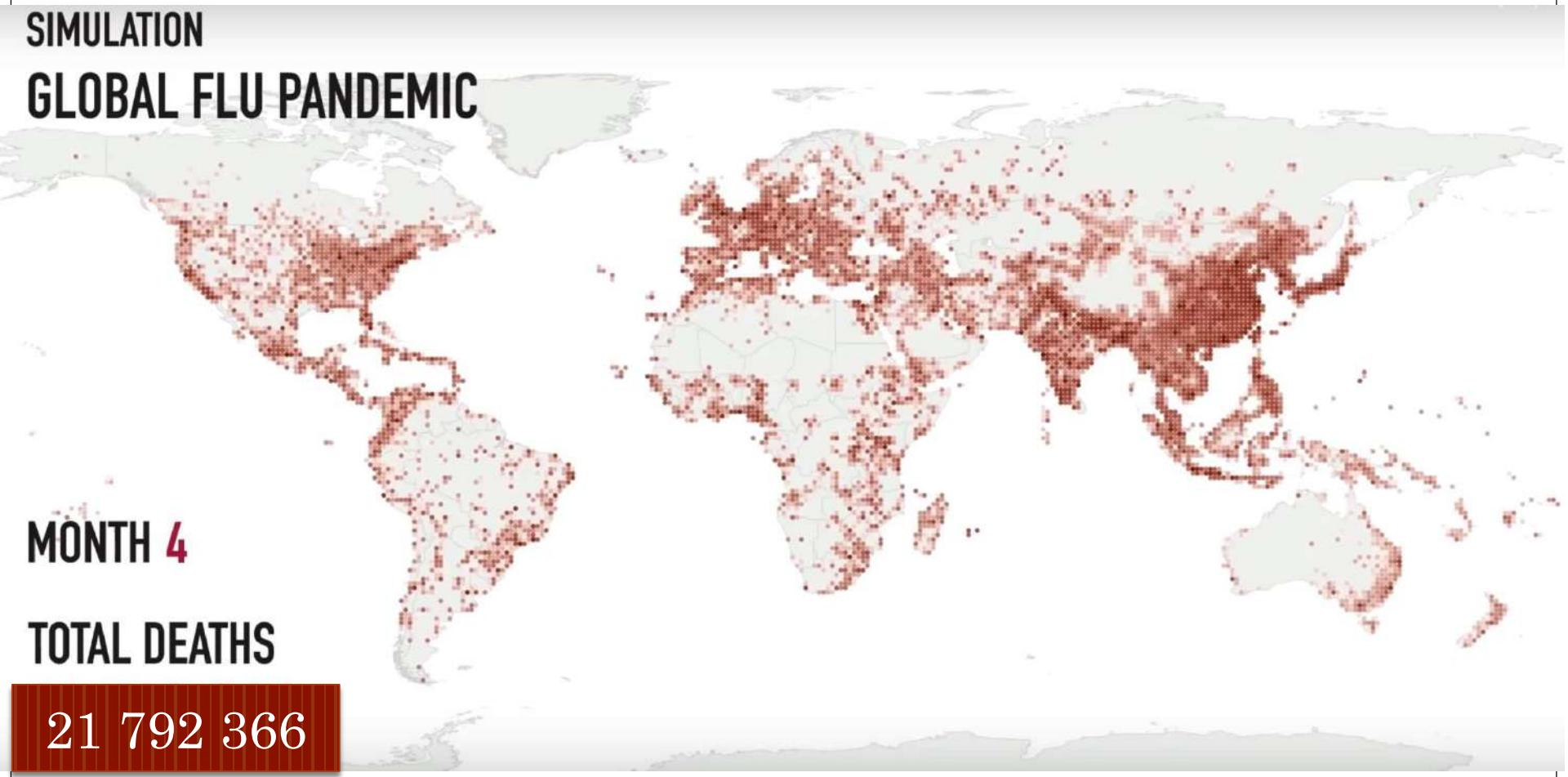

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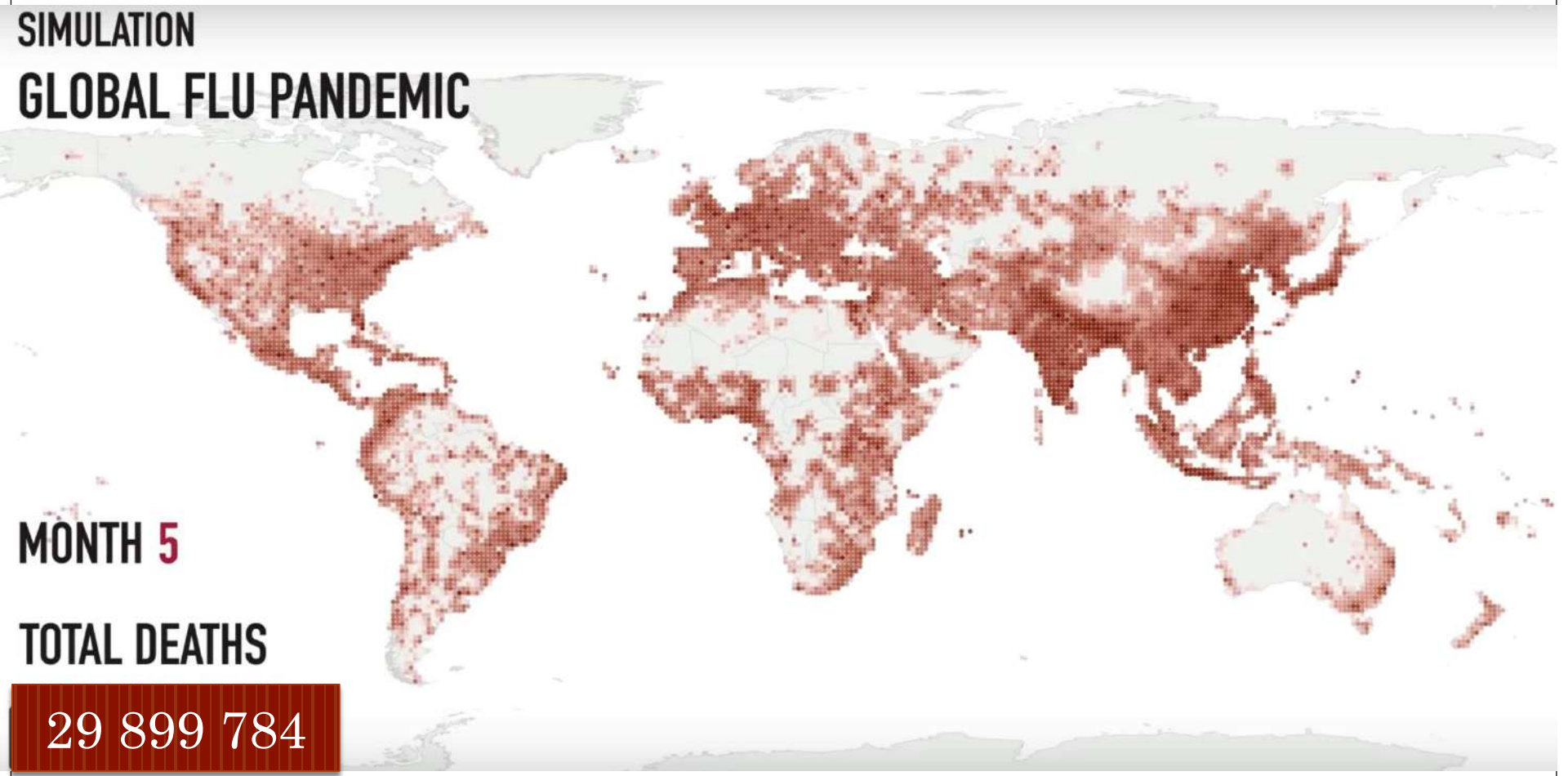
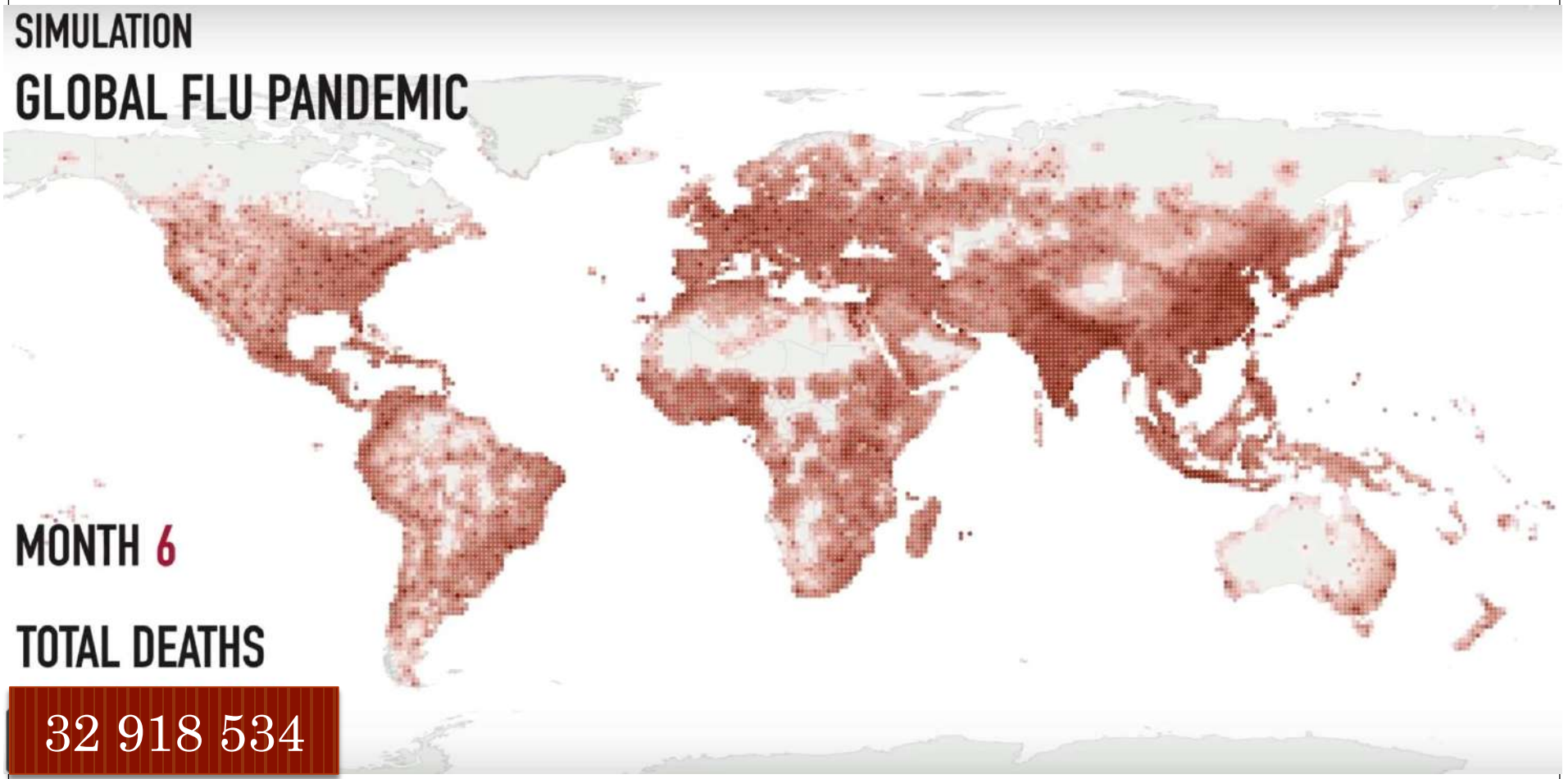


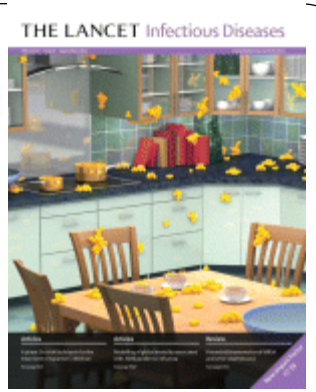
GatesFoundation/Institute of Disease Modeling



GatesFoundation/Institute of Disease Modeling

Estimated global mortality associated with the first 12 months of 2009 pandemic influenza A H1N1 virus circulation: a modelling study

Fatimah S Dawood, A Danielle Iuliano, Carrie Reed, Martin I Meltzer, David K Shay, Po-Yung Cheng, Don Bandaranayake, Robert F Breiman, W Abdullah Brooks, Philippe Buchy, Daniel R Feikin, Karen B Fowler, Aubree Gordon, Nguyen Tran Hien, Peter Horby, Q Sue Huang, Mark A Katz, Anand Krishnan, Renu Lal, Joel M Montgomery, Kåre Mølbak, Richard Pebody, Anne M Presanis, Hugo Razuri, Anneke Steens, Yeny O Tinoco, Jacco Wallinga, Hongjie Yu, Sirenda Vong, Joseph Bresee, Marc-Alain Widdowson



	Reported *	All ages		0–17 years (n [range †])	18–64 years (n [range †])	>64 years (n [range †])
		n (range †)	Rate per 100 000			
Respiratory deaths						
Africa						500 (2300–11 800)
Americas						000 (1700–8300)
Eastern Mediterrar						700 (800–4300)
Europe						200 (2300–11 700)
Southeast Asia						700 (3300–17 200)
Western Pacific						300 (3000–14 800)
Global ‡						5 400 (13 400–113 500)
Respiratory and						
Africa						100 (3200–16 200)
Americas						100 (4500–22 300)
Eastern Mediterrar						100 (1600–8200)
Europe	≥4879	31 300 (17 200–67 600)	3·5	1800 (900–3100)	17 600 (9700–31 800)	11 900 (6600–32 700)
Southeast Asia	1992	78 600 (40 900–158 900)	4·4	12 400 (6100–23 500)	54 000 (28 400–103 000)	12 200 (6400–32 500)
Western Pacific	1858	55 700 (30 600–114 500)	3·1	4300 (2200–7400)	36 400 (20 100–65 800)	15 000 (8300–41 300)
Global ‡	≥18 449	284 400 (151 700–575 400)	4·1	44 500 (22 400–80 100)	183 700 (98 800–342 200)	56 400 (30 500–233 700)

Nisan 2009 – Ağustos 2010

Laboratuvarla doğrulanmış influenza ölüm 18 500

Rapor edilenden 15 KAT daha yüksek

201 200 solunumsal (105 700 – 395 600)

83 300 kardiyovasküler (46 000 – 179 000)

%80 < 65 YAŞ

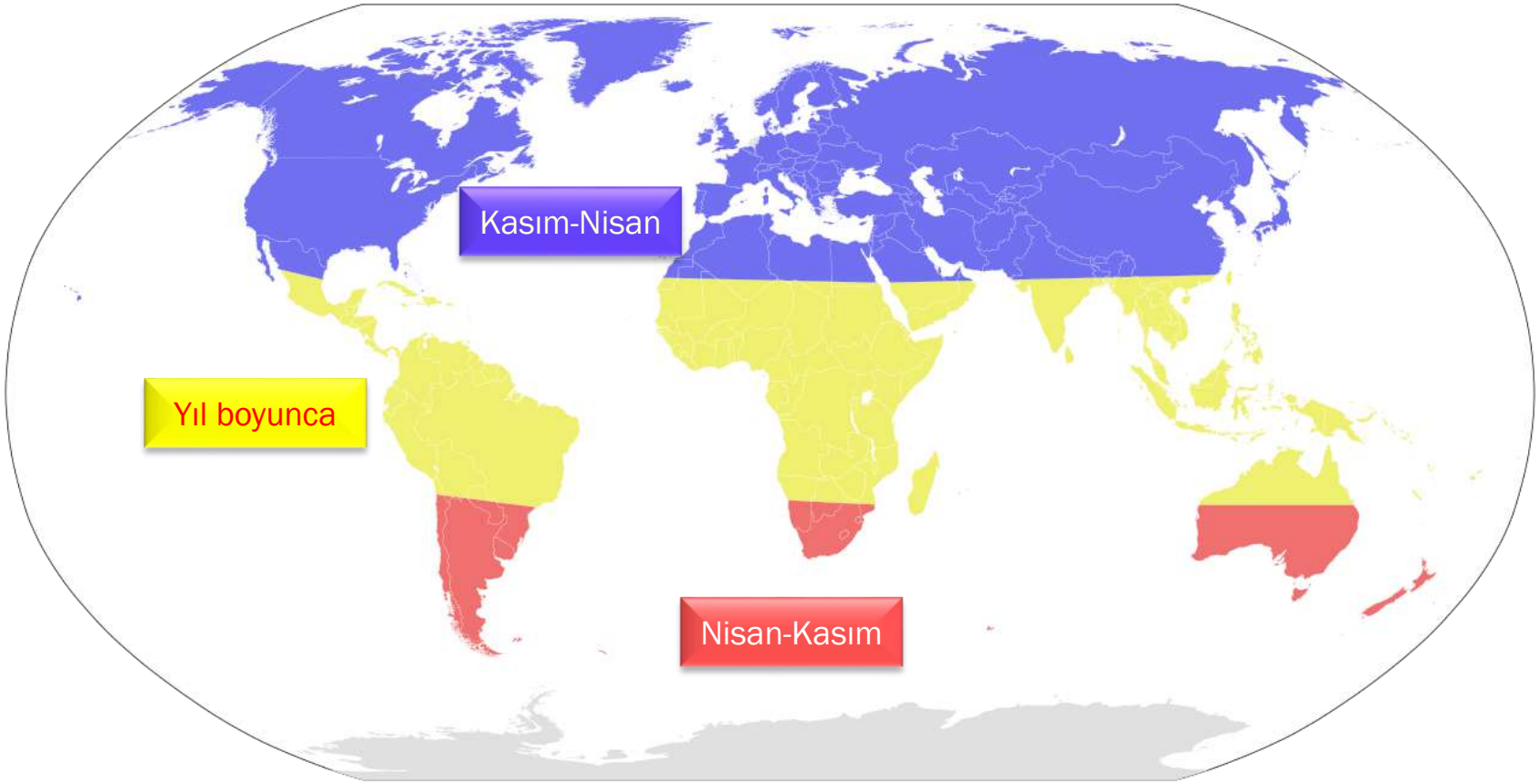
%31 Asya ve Afrika

İnfluenza bulaş

- Damlacık
- Kontamine materyale temas
- Aerosol

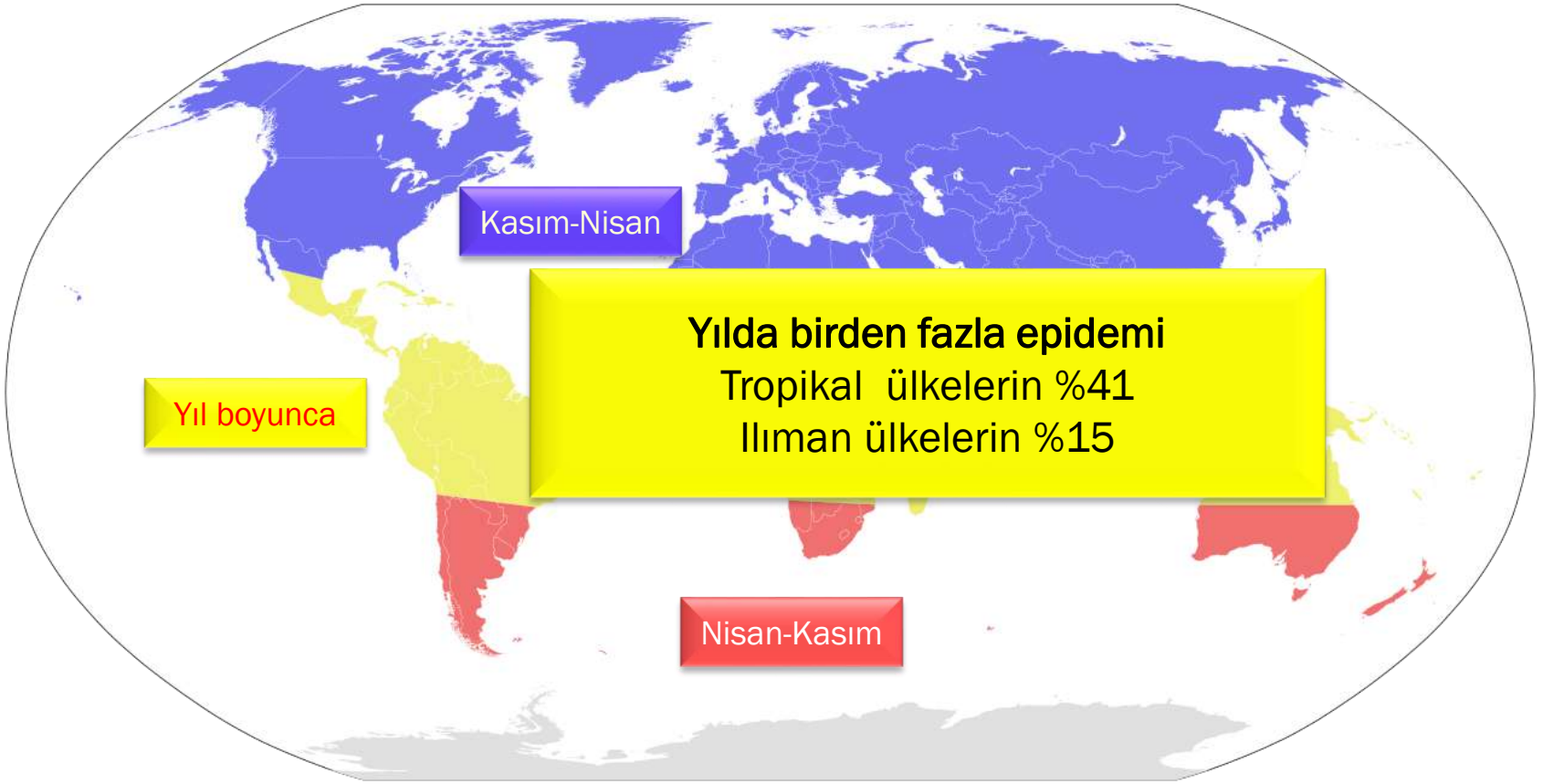
Yan J. Proc Natl Acad Sci U S A. 2018

Mevsimsel özellik



A map showing the seasonal risk areas for influenza, as indicated in the TravelWise™ pamphlet Key: Nov–Apr All Year Apr—Nov No significant population

Mevsimsel özellik



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Azziz Baumgartner E . J Infect Dis. 2012;206(6):838.

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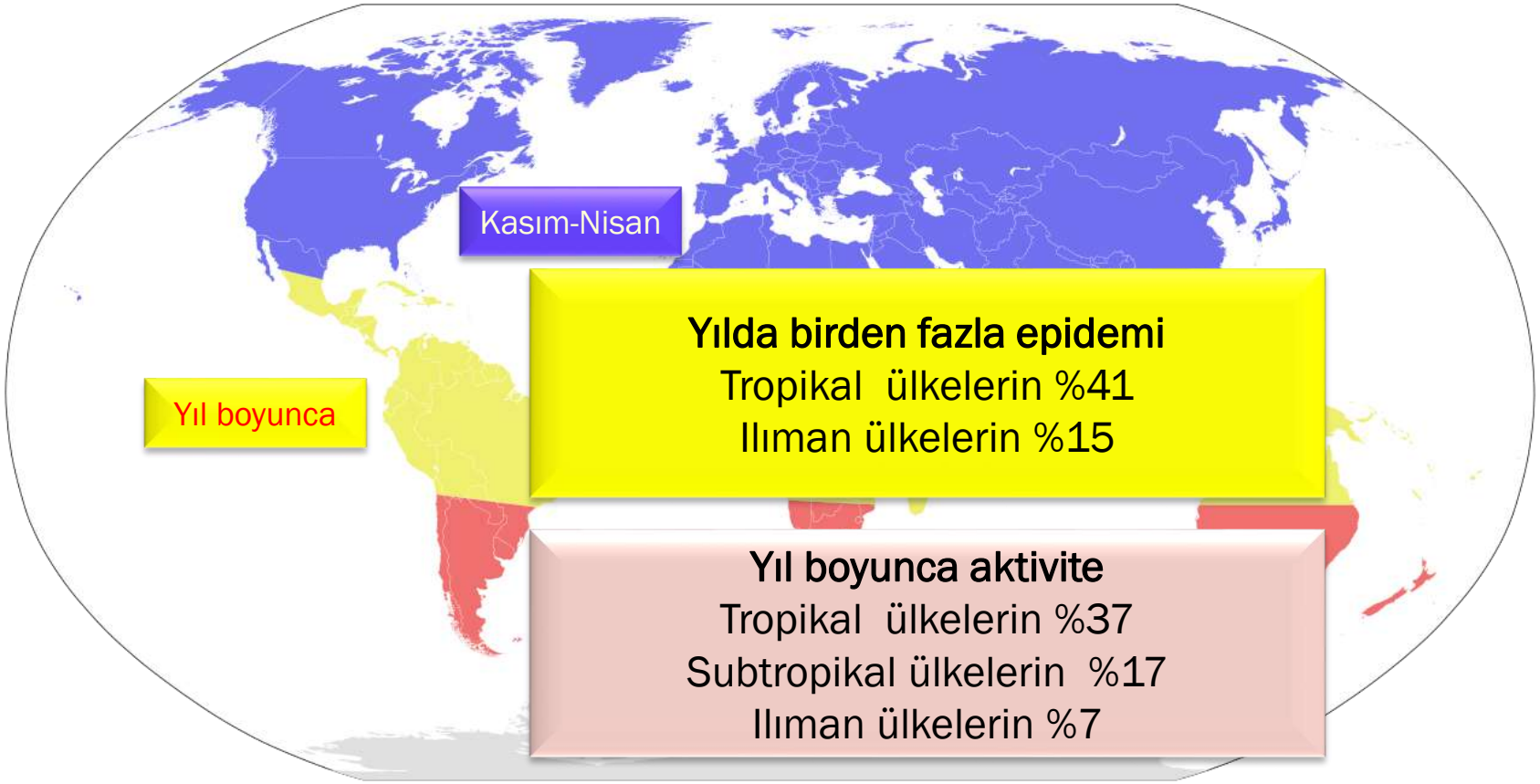


A map showing the seasonal risk areas for influenza, as indicated in the TravelWise™ pamphlet Key: Nov–Apr All Year Apr—Nov No significant population

Azziz Baumgartner E . J Infect Dis. 2012;206(6):838.

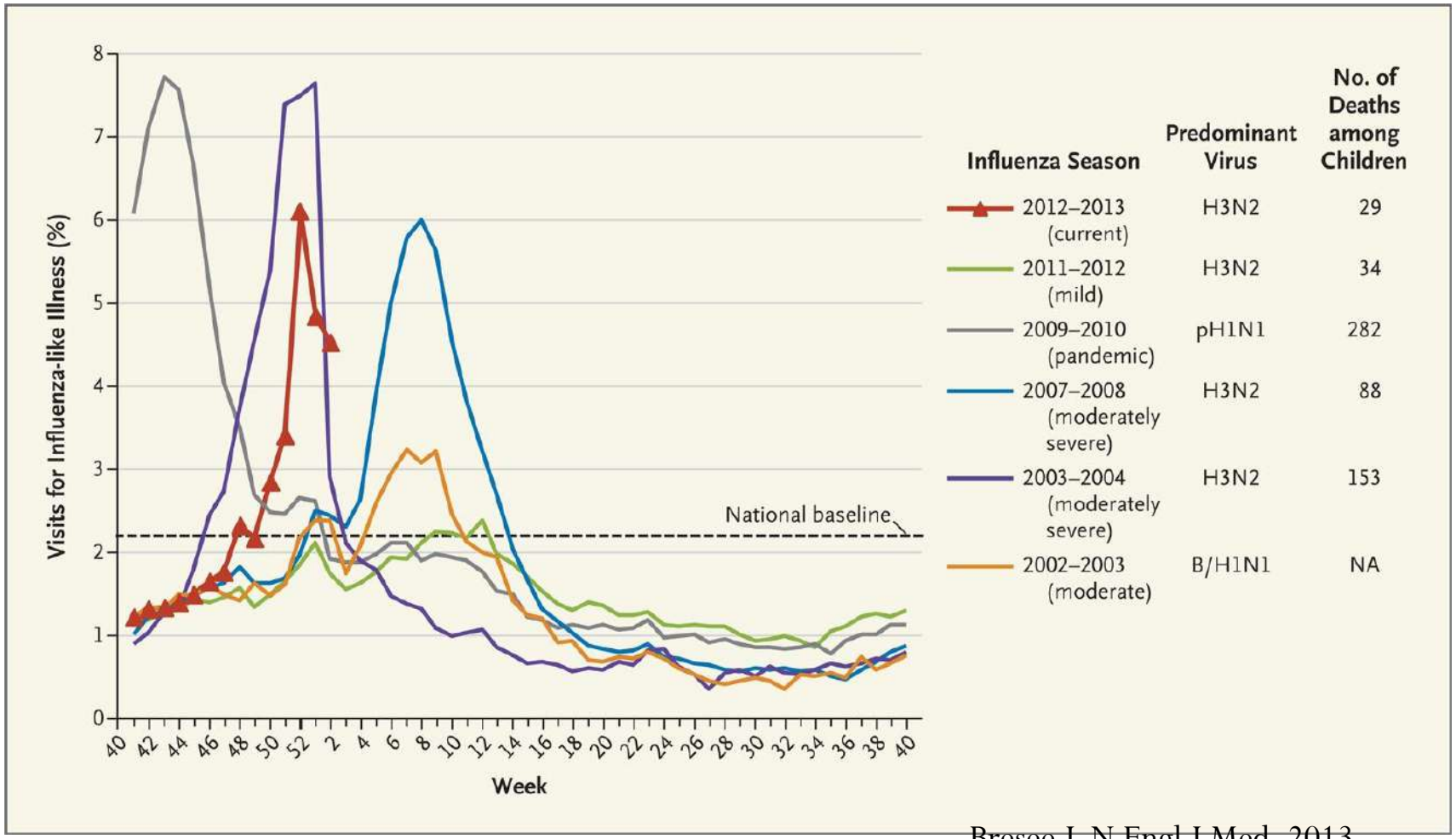
Epidemi/pandemi zamanı, süresi, şiddeti ?

- Epidemi her yıl görülür
  - Başlama zamanı, şiddeti ve süresi her sezon değişkenlik gösterir
- Pandemi her an görülebilir

Bresee J. N Engl J Med. 2013

Epidemi/pandemi zamanı,süresi, şiddeti ?

- Beklenir ancak tahmin edilemez.



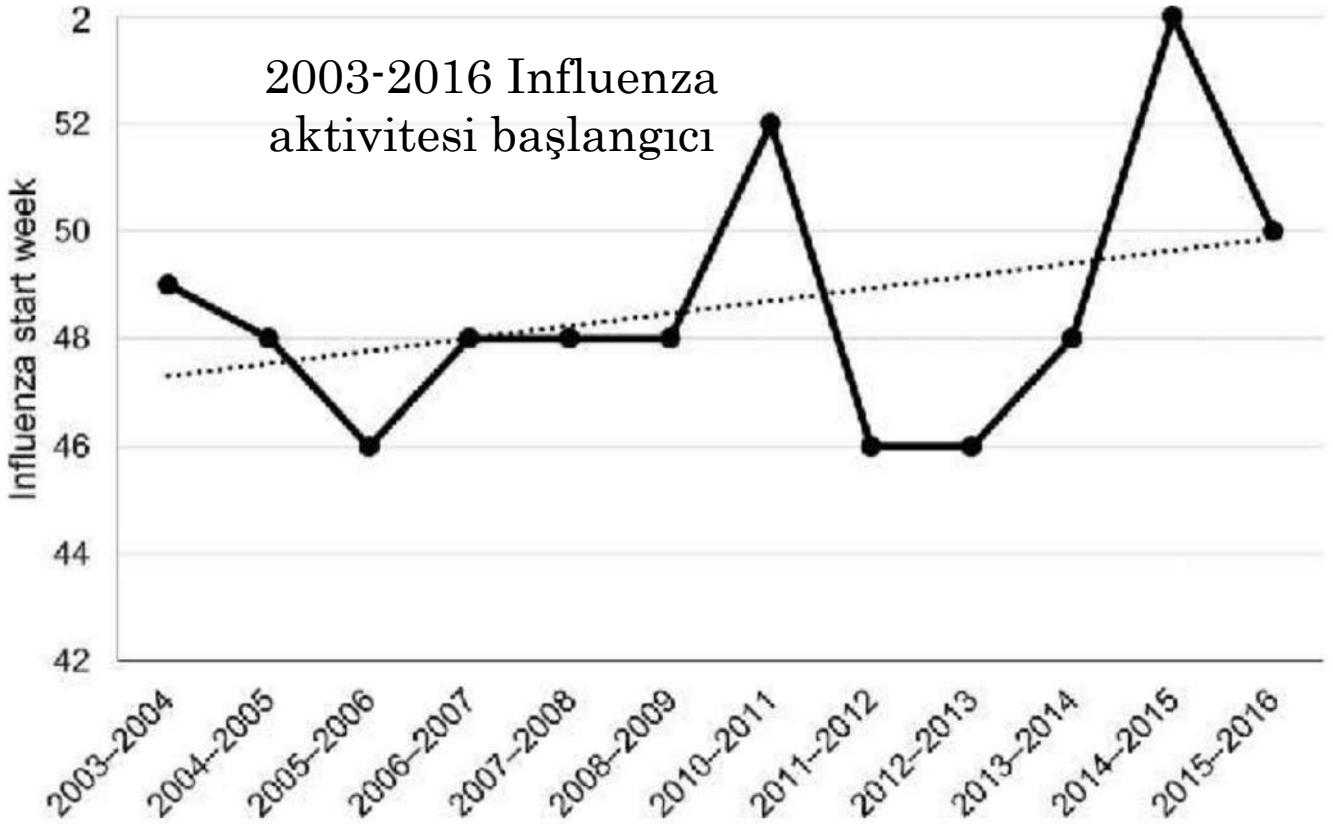
Bresee J. N Engl J Med. 2013

human VACCINES & IMMUNOTHERAPEUTICS

Hum Vaccin Immunother. 2018; 14(8): 1899–1908. PMCID: PMC6149844
Published online 2018 Apr 25. doi: 10.1080/21645515.2018.1452577 PMID: 29543569

Influenza surveillance in Western Turkey in the era of quadrivalent vaccines: A 2003–2016 retrospective analysis

Sevim Meşe,[a] Aysun Uyanik,[a] Alev Özakay,[b] Serdar Öztürk,[b] and Selim Badur[b]



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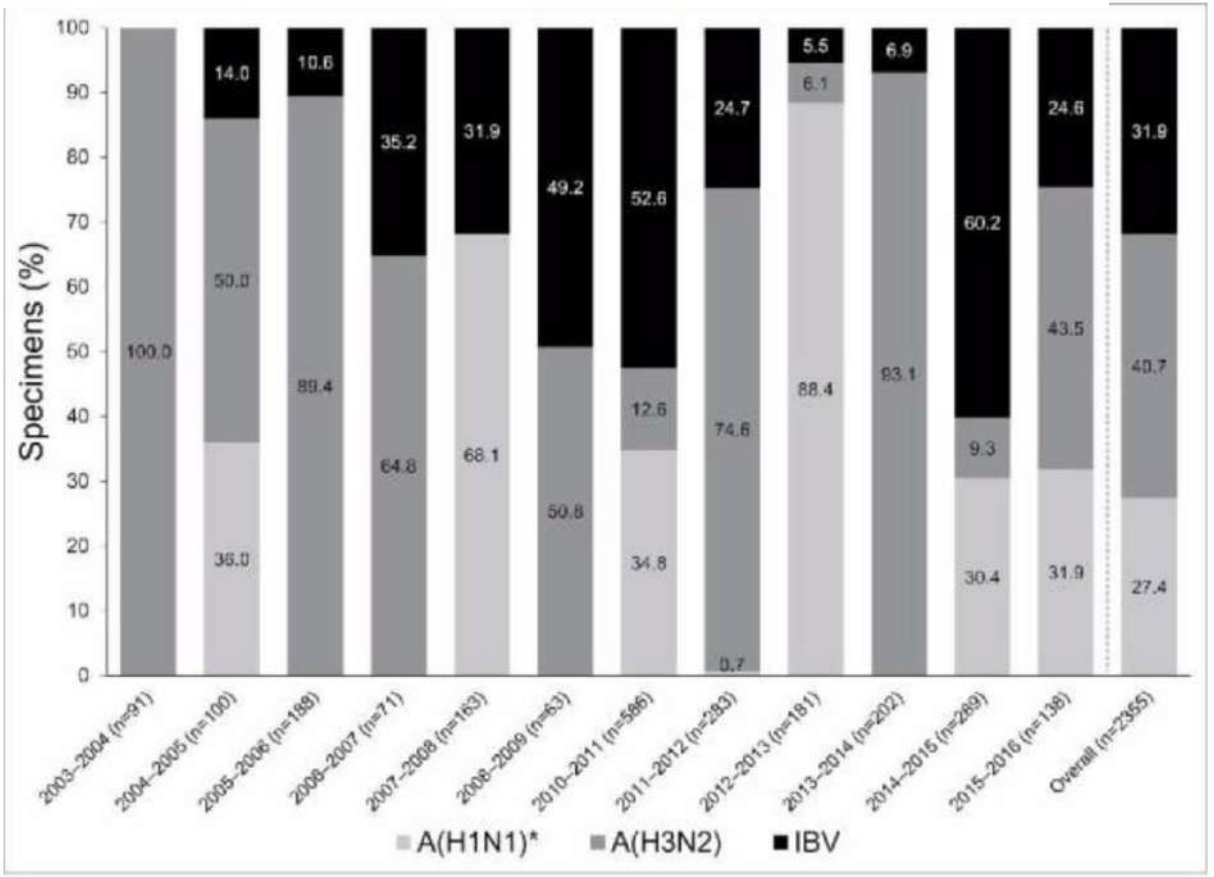
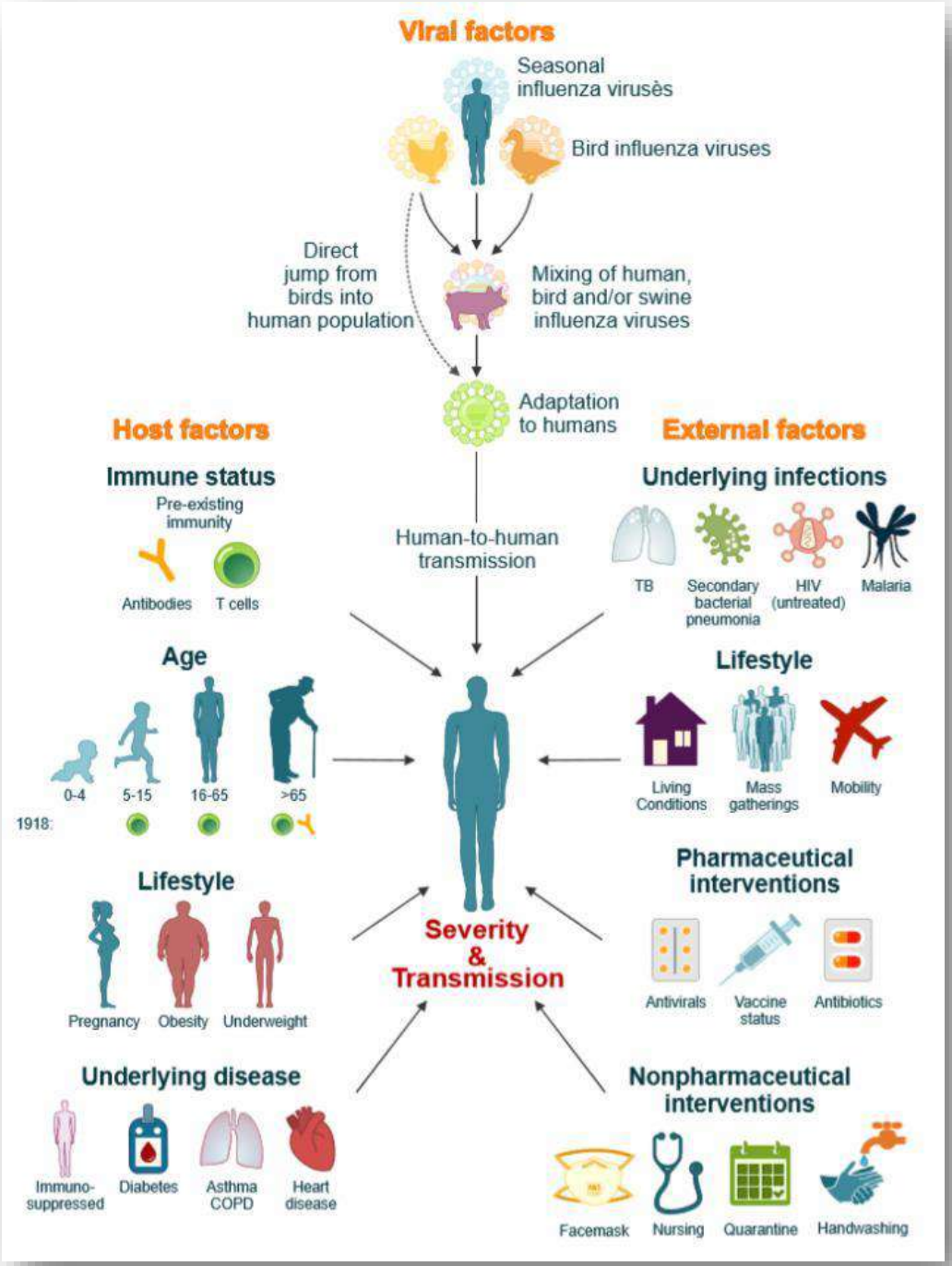
2013-2016 Influenza patojen dağılımı




Viral factors
Seasonal influenza virusès
Bird influenza viruses
Direct jump from birds into human population
Mixing of human, bird and/or swine influenza viruses
Adaptation to humans
Host factors
External factors
Immune status
Pre-existing immunity
Antibodies
T cells
Human-to-human transmission
Underlying infections
TB
Secondary bacterial pneumonia
HIV (untreated)
Malaria
Age
0-4
5-15
16-65
>65
1918:
Lifestyle
Living Conditions
Mass gatherings
Mobility
Lifestyle
Pregnancy
Obesity
Underweight
Severity & Transmission
Pharmaceutical interventions
Antivirals
Vaccine status
Antibiotics
Underlying disease
Immuno-suppressed
Diabetes
Asthma COPD
Heart disease
Nonpharmaceutical interventions
Facemask
Nursing
Quarantine
Handwashing

Virus tipi ile şiddeti arasındaki ilişki

- Hastaneye yatan ≥65 yaş influenza infeksiyonu; influenza A ve B arasında
  - Yatış süresi
  - Yoğun bakım gerekliliği
  - Mortalite açsından fark yok
    - Su S. Clin Infect Dis. 2014
- H3N2 > influenza B > H1N1
  - Thompson WW. JAMA. 2004, Dao CN. J Infect Dis. 2010
- 2010-2011 influenza sezonu
  - Hastaneye yatan hastalarda H1N1, H3N2 veya influenza B'ye göre daha şiddetli hastalık
    - Chaves SS. J Infect Dis. 2013

Risk faktörleri

- Gebeler
- ≥65 yaş - <5 yaş
- Kronik hastalığı olanlar
  - Kardiyak, Pulmoner, renal, metabolik, KC, hematolojik, nörolojik, kan hastalıkları
- İmmün yetmezliğe neden olan durumlar
  - HIV, kemoterapi, Malignite, steroid
  - >19 yaş uzun süreli aspirin tedavisi alanlar
- <19 yaş uzun süreli aspirin tedavisi alanlar
- Yaşlı bakim evinde kalanlar

www.cdc.gov/flu/about/disease/high_risk.htm

Risk faktörleri

- Yaş: H1N1 çocuklar ve gençlerde daha yaygın.
- Gebelik: Özellikle son dönemlerde
- Obesite
  - Yeni bir risk faktörü mü? Louie JK, et al. A novel risk factor for a novel virus: obesity and 2009 pandemic influenza A (H1N1). Clin Infect Dis 2011.
  - Karıştırıcı etken (confounder) ? Diaz E, et al. Impact of obesity in patients infected with 2009 influenza A (H1N1). Chest 2011.

International Journal of Infectious Diseases 81 (2019) 6–9

Contents lists available at ScienceDirect

International Journal of Infectious Diseases

journal homepage: www.elsevier.com/locate/ijid

Predictors of fatality in influenza A virus subtype infections among inpatients in the 2015–2016 season

S. Tekin[a], S. Keske[b], S. Alan[c], A. Batirel[d], C. Karakoc[e], N. Tasdelen-Fisgin[f], S. Simsek-Yavuz[g], B. Isler[h], M. Aydin[i], M. Kapmaz[j], F. Yilmaz-Karadag[k], O. Ergonul[l,*]

2015-2016, İstanbul

11 merkez

222 Influenza A PCR (+) hasta

Table 1
Demographic characteristics of the patients infected with influenza A and their risk factors for mortality.

	Died $n=25$, n (%)	Survived $n=197$, n (%)	p-Value
Sex, female	10 (40)	116 (59)	0.073
Age (years), mean ± SD	65 ± 22	36 ± 26	<0.001
Age ≥65	14 (56)	33 (17)	<0.001
Age ≤16	0 (0)	58	0.002
Obese	1 (4)	13 (7)	0.615
Pregnant women	1 (5)	6 (5)	0.939
Comorbid chronic diseases			
Chronic heart disease	9 (36)	19 (10)	<0.001
Diabetes mellitus	5 (24)	23 (12)	0.085
Chronic renal disease	6 (24)	8 (4)	<0.001
Chronic neurological disease	5 (20)	11 (6)	0.009
Chronic obstructive lung disease	3 (12)	24 (12)	0.979
Malignancy	5 (20)	13 (7)	0.021
Vaccinated	0	4 (2)	0.472
Laboratory findings			
Leukocyte count ($\times 10^9$/l), median	5.84	7.39	0.146
Thrombocyte count ($\times 10^9$/l), median	123	197	0.004
AST (U/l), median	112	34	<0.001
ALT (U/l), median	44	27	<0.001
CPK (μg/l), median	239	120	0.001
LDH (IU/l), median	478	320	0.025
CRP (mg/l), median	91	22	0.004
Influenza A H3N2	13 (54)	39 (21)	<0.001
Influenza A H1N1	11 (45)	144 (79)	<0.001
Chest X-ray findings			
Lobar	2 (8)	9 (5)	0.456
Interstitial	11 (44)	44 (22)	0.018
Bilateral involvement	17 (71)	52 (39)	<0.001
Days to starting oseltamivir after disease onset, mean ± SD	4 ± 3	2.6 ± 2	0.025
Secondary bacterial infection	3 (12)	7 (4)	0.055
Days from onset to hospital admission, mean	3.8	2.7	0.04
ICU stay	20 (80)	20 (10)	<0.001
Use of invasive mechanical ventilation	17 (94)	12 (11)	<0.001
Use of non-invasive mechanical ventilation	6 (33)	15 (13)	0.023
Length of hospital stay (days), mean ± SD	7 ± 6	8 ± 10	0.664
Antibiotic use	18 (78)	122 (64)	0.171

2015-2016: 212 influenza A/İstanbul

Table 3
Univariate and multivariate analyses for the predictors of mortality among the adult inpatients.

	Univariate analysis			Multivariate analysis		
	OR	95% CI	*p*-Value	OR	95% CI	*p*-Value
Age >65 years	6.3	2.63–15.15	<0.001	6.9	2.07–23.08	0.002
H3N2 vs. H1N1	4.3	1.81–10.49	0.001	4.2	1.27–14.38	0.019
One day delay of oseltamivir	1.2	1.01–1.39	0.032	1.3	1.01–1.63	0.036
Secondary bacterial infection	3.7	0.89–15.35	0.07	2.8	0.4–20.55	0.294
Presence of malignancy	3.5	1.14–10.95	0.028	1.25	0.19–8.22	0.811

Tekin S, et al. Predictors of fatality in influenza A. Int J Infect Dis 2019

Patogenez Klinik

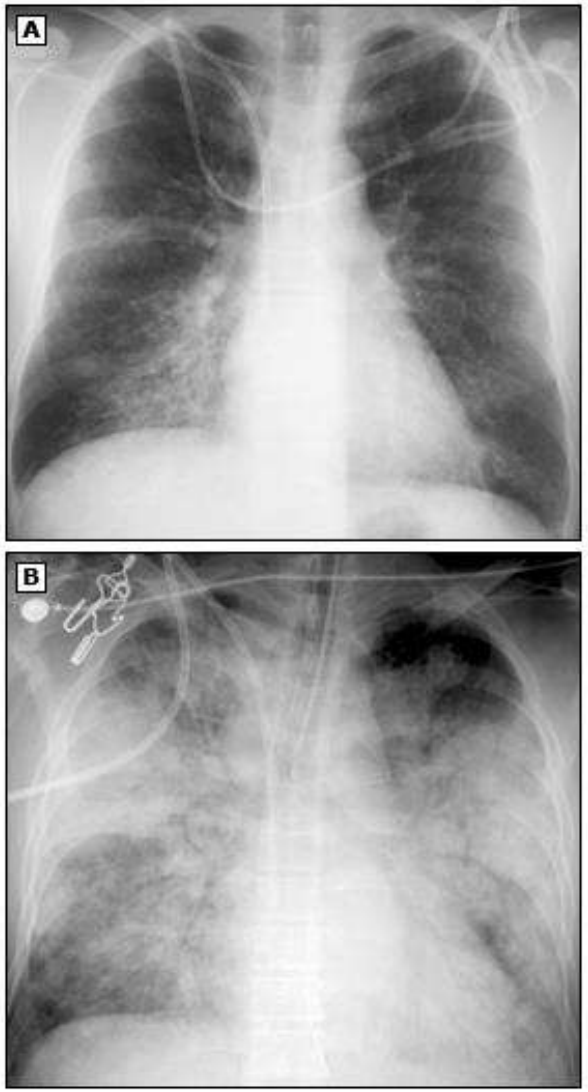
- İnkübasyon 2 gün (1-4 gün)
- Respiratuar epitelde replikasyon ve hasar
- Nadiren viremi
- Solunum seksiyonları ile virüs atılımı;
  - 1-2 gün öncesi, 5-10 gün sonrası

Klinik

- Yıllık atak hızı
  - Yetişkin %5-10
  - Çocuk %20-30
    - Vaccines against influenza WHO position paper – November 2012. *Wkly Epidemiol Rec. 2012*
- %50 klasik semptomlar gelişir
  - Ani başlangıçlı ateş
  - Miyalji
  - Boğaz ağrısı
  - Nonprodüktif öksürük
  - Baş ağrısı

Komplikasyonlar

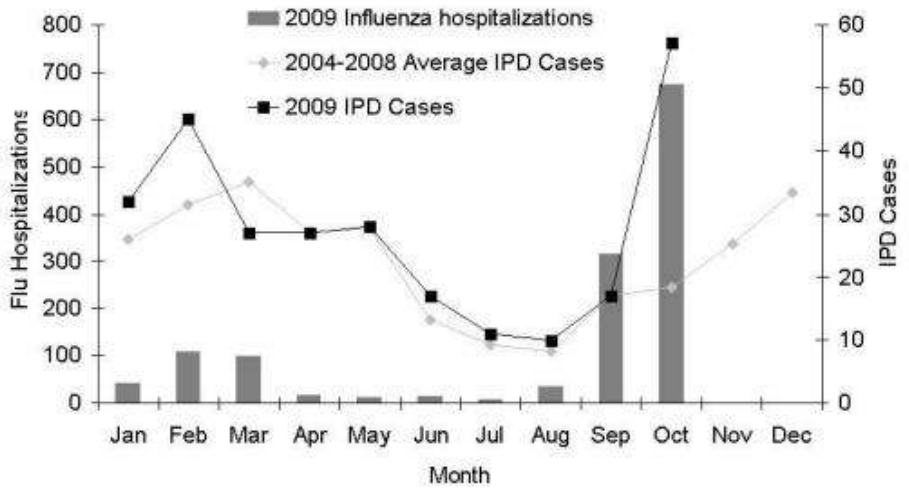
- Pnömoni
  - Primer influenza
  - Sekonder bakteriyel
    - *S. pneumoniae*, *H. influenza*, *S. aureus*
- Reye sendromu
- Miyokardit
- SSS enfeksiyonu
- Ölüm <1/100 000



Influenza ve *S. pneumoniae* birlikteliği

- Fatal olguların %22'si bakteriyemik
- %45'inde etken *Streptococcus pneumoniae*
  - Bacterial coinfections in lung tissue specimens from fatal cases of 2009 pandemic influenza A (H1N1) - United States, May-August *;58(38):1071-4.*

Influenza Hospitalizations & Invasive Pneumococcal Cases, All Ages,
Denver Metro, Provisional 2009 (year-to-date) vs. 5 -Year Average (2004-2008)



*Denver Metro includes Adams, Arapahoe, Denver, Douglas, and Jefferson Counties

Data courtesy of K. Gershman, Colorado Emerging Infections Program & Influenza Division, CDC

Santral sinir sistemi komplikasyonları

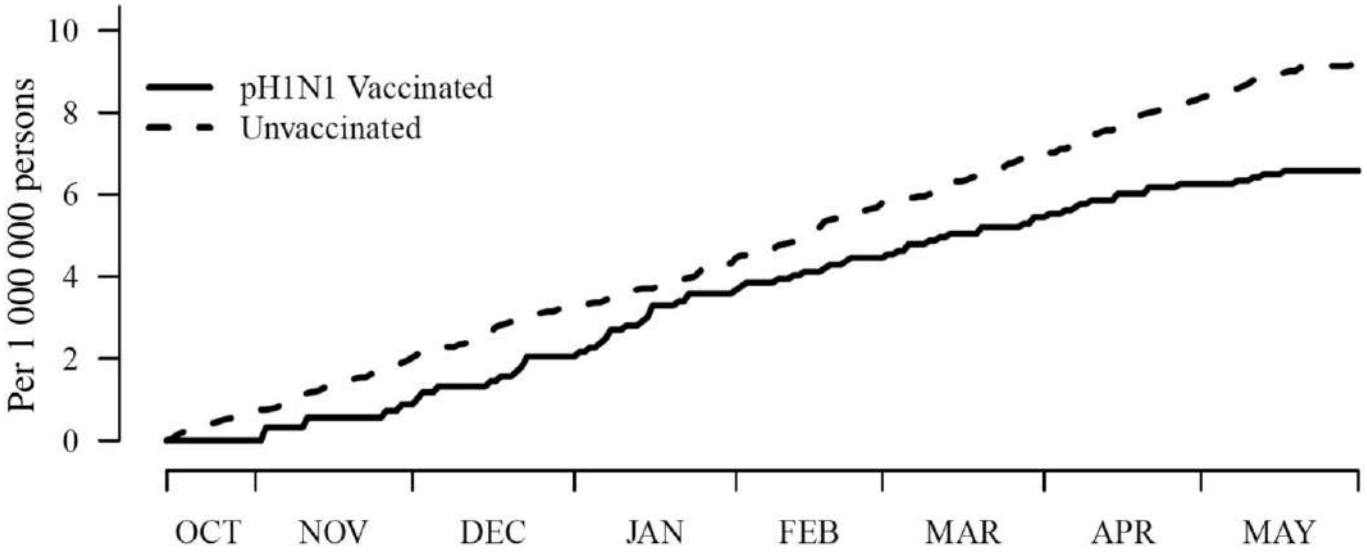
- Ensefalopati
- Ensefalit
- Transvers miyelit
- Aseptik menenjit
- **Guillain Barre sendromu**

Goenka A, Clin Infect Dis. 2014

Guillain Barre sendromu

- Yıllık GBS insidansı 0.4–4.0 vaka 100 000 popülasyon, tüm yaşlar içerisinde
- A/New Jersey/1976 aşısı sonrası GBS rapor edildi
- **Atfedilebilir risk, uygulanan her 100 000 doz için 1 GB ek vaka tahmin edilmiştir.**
  - **Schonberger LB. Am J Epidemiol , 1979**

Aşı Guillain Barre sendromuna karşı koruyucu



GBS kümülatif riski aşılanmamış popülasyonda aşılananlara göre YÜKSEK (her 9.2 milyon vs 6.6 milyon kişi; $P = .012$)

Gerçekten aşılamadan sonraki 6 hafta boyunca GBS riskinde artış olabilir ve kanıtlar bu iddiayı desteklemektedir, ancak popülasyon düzeyinde hayatta kalma analizi, aşılananlar arasında GBS'nin genel riskinin 2009 H1N1 pandemi sırasında daha düşük olduğunu göstermektedir.

Vellozzi C. Am J Public Health , 2014

Kardiyak komplikasyon

- Elektrokardiyofik (EKG) değişiklikler
- Akut miyokardiyal infarkt
- Miyokardit
- Perikardit

Kwong JC. N Engl J Med. 2018

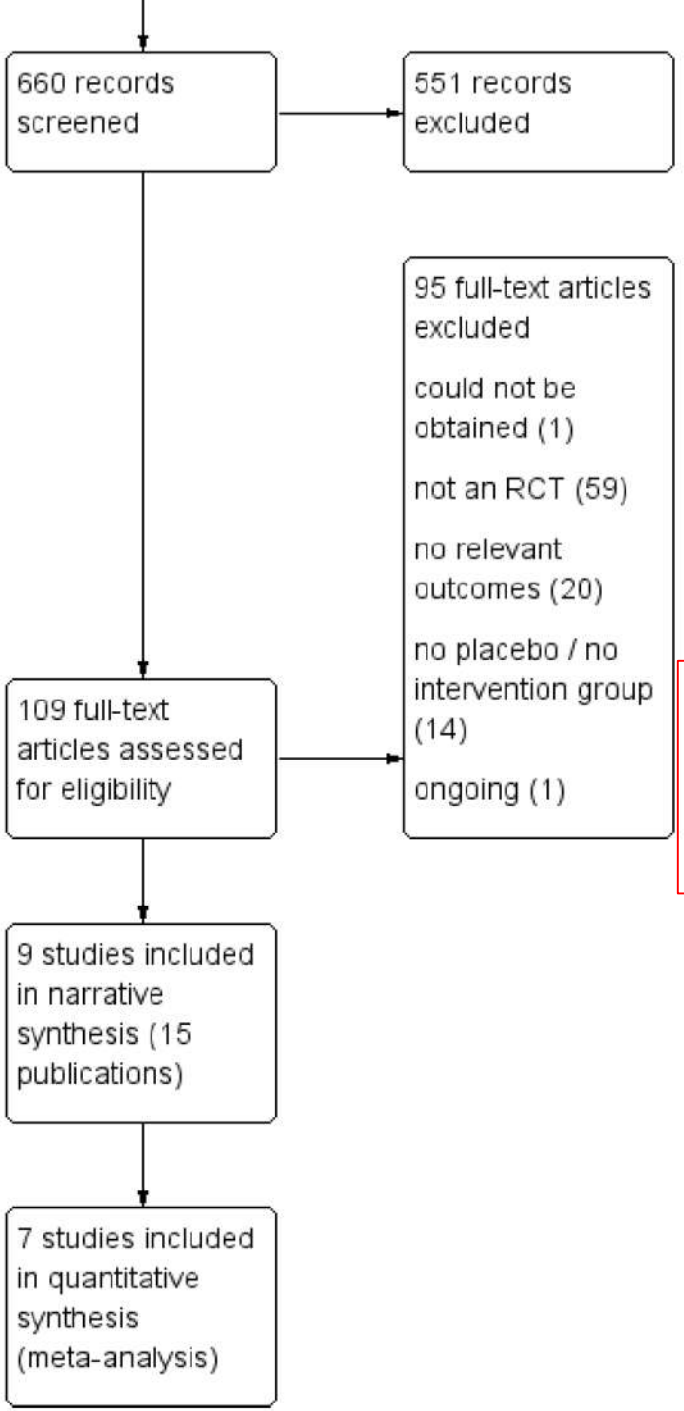
Cochrane Library

Cochrane Database of Systematic Reviews

Influenza vaccines for preventing cardiovascular disease (Review)

Clar C, Oseni Z, Flowers N, Keshtkar-Jahromi M, Rees K

Cochrane Database of Systematic Reviews 2015, Issue 5. Art. No.: CD005050.



Koroner arter hastalığı olanlarda
İnfluenza aşılaması sonucunda;

RR: 0.45 (0.26-0.76), *P*=0.003

Avrupa'da 30 milyon KAH hastası var
Bağışıklama oranı %45,6'dan %75'e çıkarsa

42.000 kardiyovasküler ölüm engellenebilir

Mortalite <1/100000???

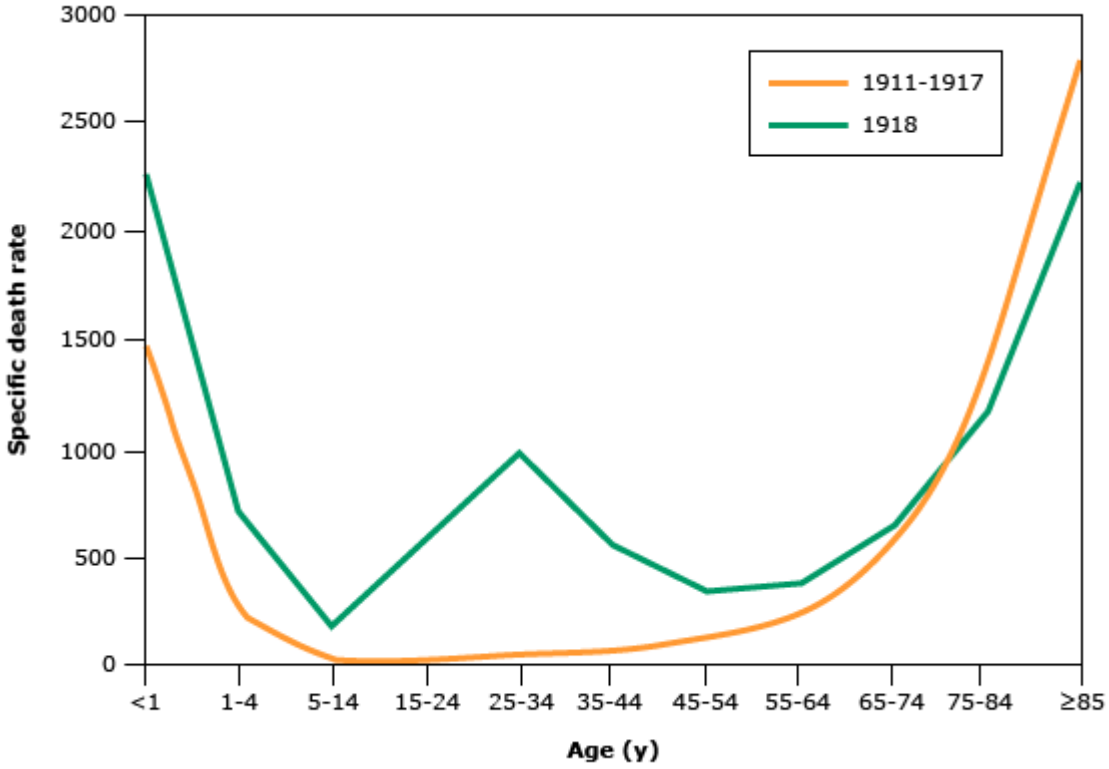
Estimates of global seasonal influenza-associated respiratory mortality: a modelling study

A Danielle Iuliano, Katherine M Roguski, Howard H Chang, David J Muscatello, Rakhee Palekar, Stefano Tempia, Cheryl Cohen, Jon Michael Gran, Dena Schanzer, Benjamin J Cowling, Peng Wu, Jan Kyncl, Li Wei Ang, Minah Park, Monika Redlberger-Fritz, Hongjie Yu, Laura Espenhain, Anand Krishnan, Gideon Emukule, Liselotte van Asten, Susana Pereira da Silva, Suchunya Aungkulanon, Udo Buchholz, Marc-Alain Widdowson, Joseph S Bresee, for the Global Seasonal Influenza-associated Mortality Collaborator Network*

Lancet, The, 2018-03-31, Volume 391, Issue 10127, 1285-1300,

- 1999-2015 arası, 33 ülke
- Mevsimsel influenza ile ilişkili solunumsal ölüm **291 243–645 832** (4,0–8,8 /100 000/yıl)
  - <5 yaş 9243-105 690 (2,1-23,8/100 000)
  - <65 yaş 67 255-342 576 (0,1-6,4/100 00)
  - 65-74 yaş 48 810-102 187 (2,9-44,0/100 000)
  - >75 yaş 122 876-237 933 (17,9-223,5 /100 000)

Pandemilerde mortalite 1918-1919

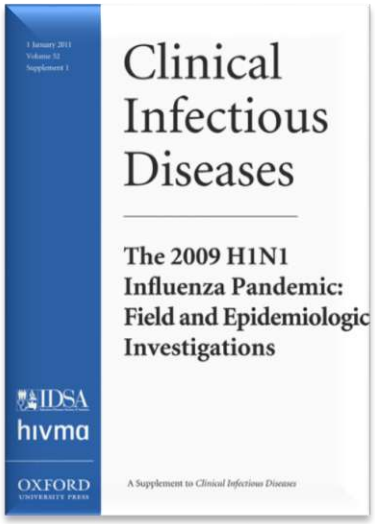


Reproduced from: Taubenberger JK, Morens DM. 1918 influenza: The mother of all pandemics. Emerg Infect Dis 2006; 12:15.

Pandemilerde mortalite 2009-2010

Estimating the Burden of 2009 Pandemic Influenza A (H1N1) in the United States (April 2009–April 2010)

Clinical Infectious Diseases, January 2011, S75–S82,



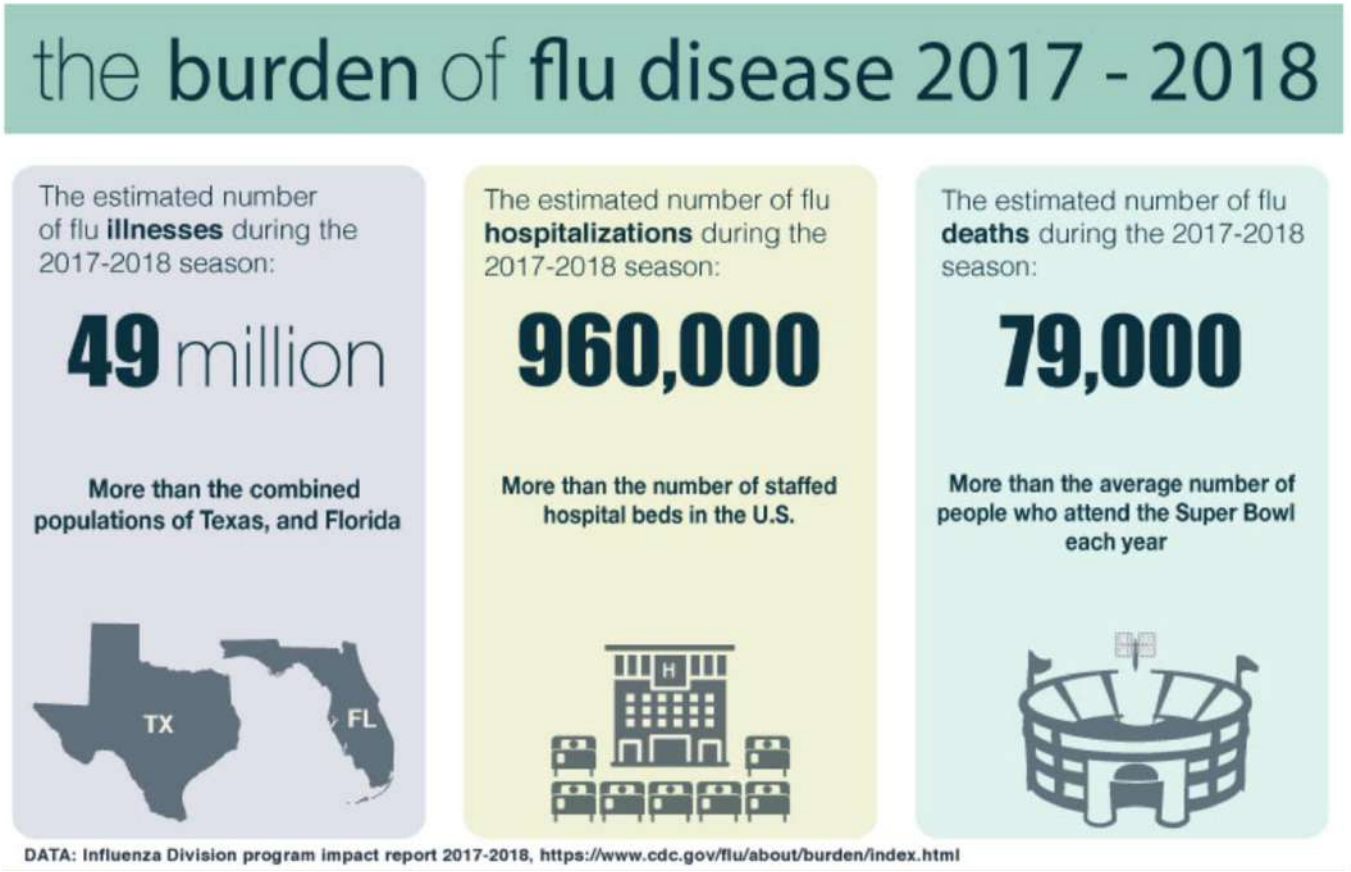
	0-17	18-64	>65	Total
Hastaneye yatış	87 000	160 000	27 000	274 000
Mortalite	1280	9570	1620	12470

İnfluenza yükü

- Küresel
  - Virüs tipine, alt tipine, yaş gruplarına göre değişir
  - 1 Milyar olgu
  - 3-5 milyon / yıl ağır olgu
  - 290-650 000/ yıl ölüm

http://www.who.int/en/news-room/fact-sheets/detail/influenza-(seasonal)

USA



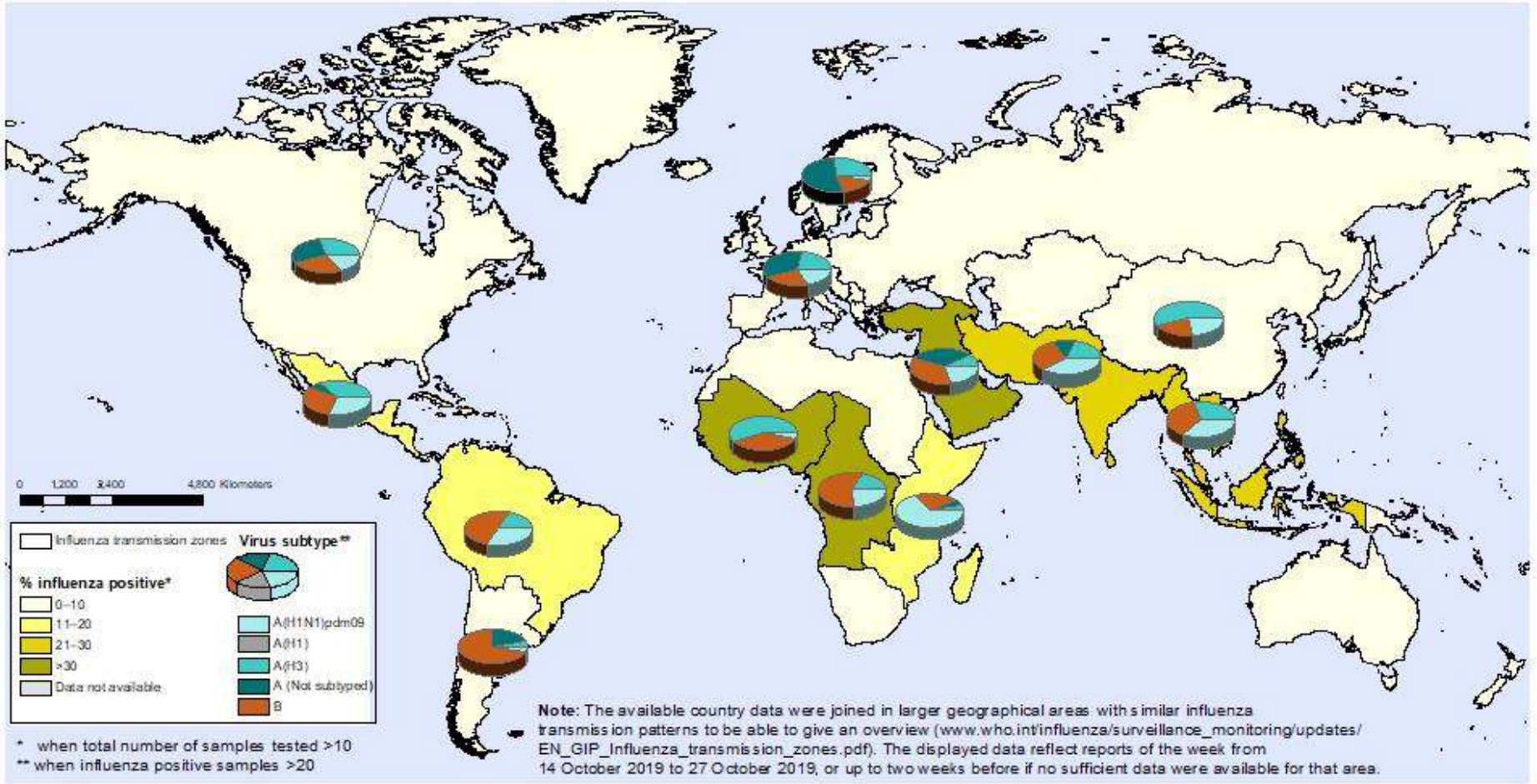
Yatışların >%70, ölümlerin >%90 >65 yaş

Bakim evlerinde atak hızı %60, mortalite %30

12 milyar / yıl maliyet

Percentage of respiratory specimens that tested positive for influenza
By influenza transmission zone

Status as of 08 November 2019



* when total number of samples tested >10
** when influenza positive samples >20

Note: The available country data were joined in larger geographical areas with similar influenza transmission patterns to be able to give an overview (www.who.int/influenza/surveillance_monitoring/updates/EN_GIP_Influenza_transmission_zones.pdf). The displayed data reflect reports of the week from 14 October 2019 to 27 October 2019, or up to two weeks before if no sufficient data were available for that area.

Data Source:
Global Influenza Surveillance and Response System (GISRS),
FluNet (www.who.int/flunet)

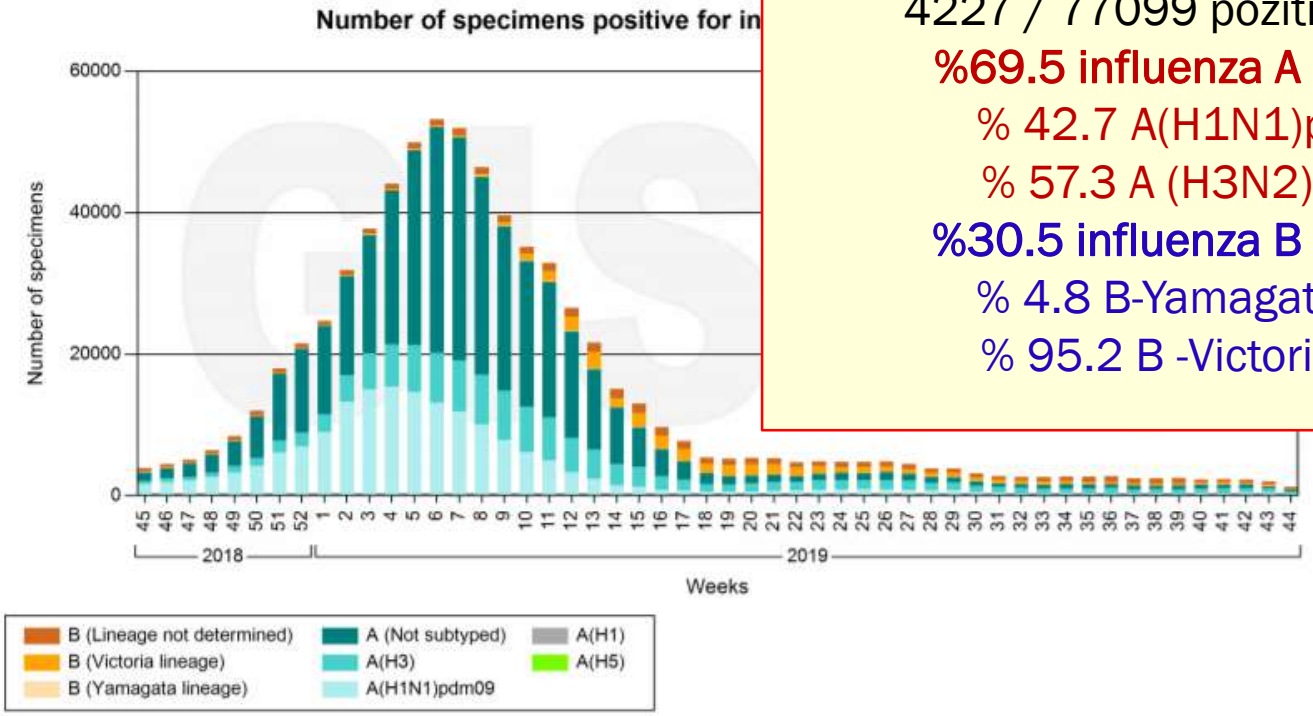
World Health Organization

World Health Organization

Influenza Laboratory Surveillance Information

by the Global Influenza Surveillance and Response System (GISRS)

Global circulation of influenza viruses



Data source: FluNet (www.who.int/flunet), GISRS

Flunet (106 ülke)

14 Ekim 2019 – 27 Ekim 2019

4227 / 77099 pozitif

%69.5 influenza A

% 42.7 A(H1N1)pdm09

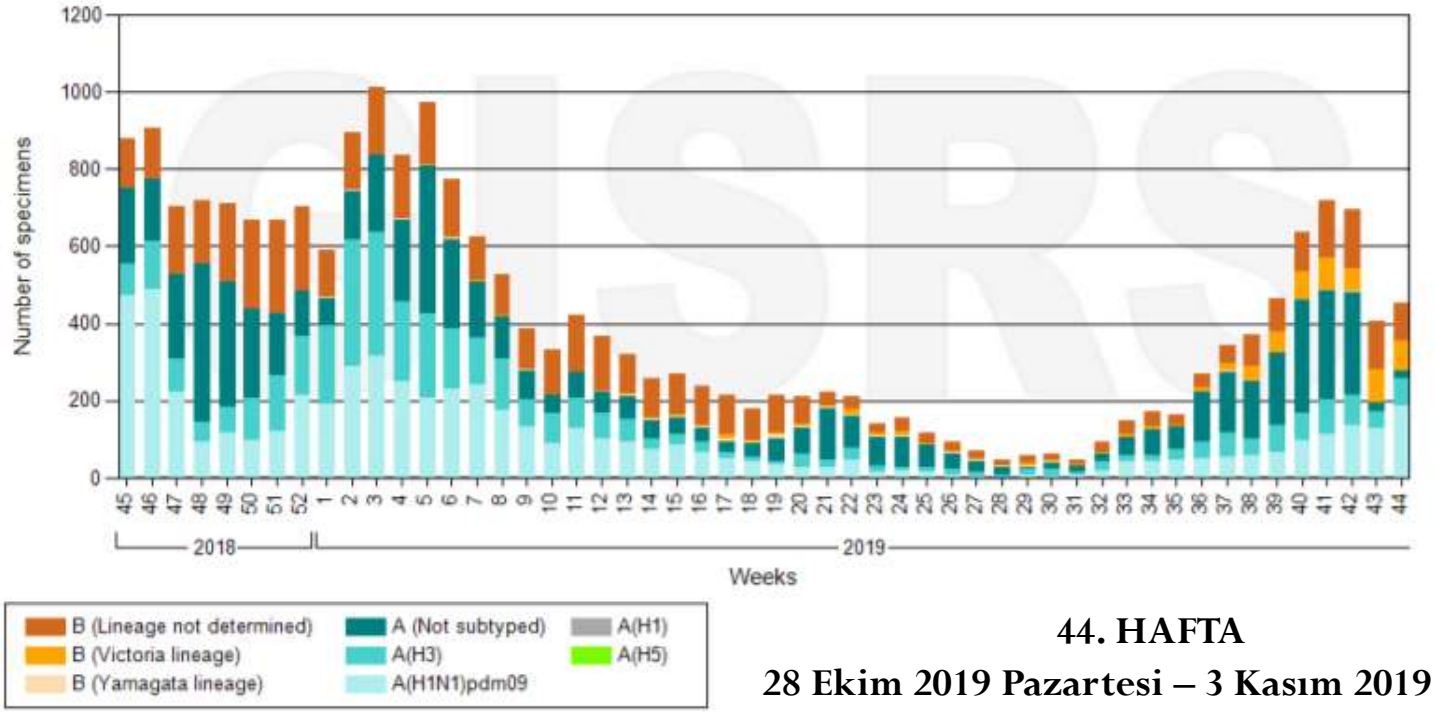
% 57.3 A (H3N2)

%30.5 influenza B

% 4.8 B-Yamagata

% 95.2 B -Victoria

Number of specimens positive for influenza by subtype in Western Asia



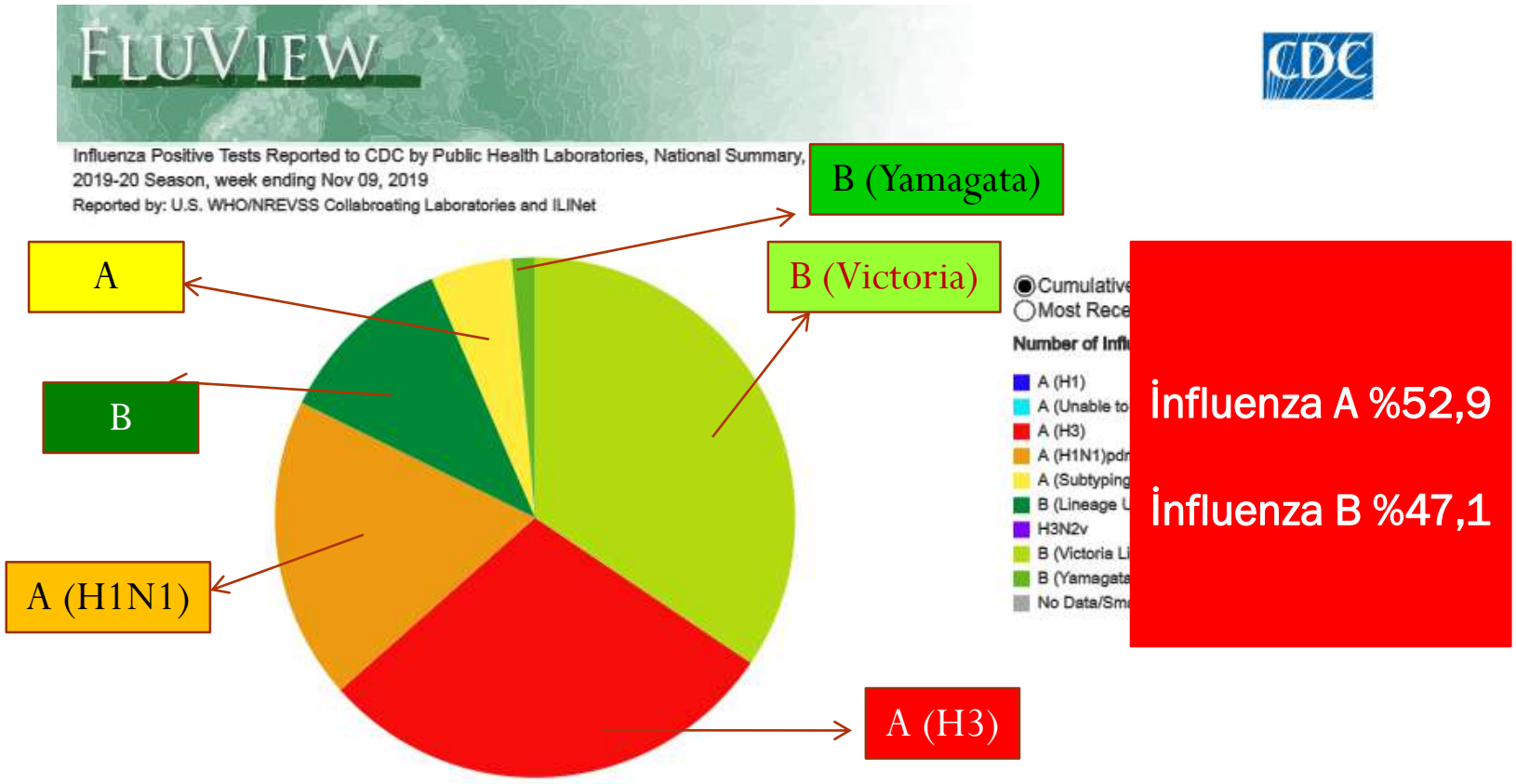
44. HAFTA

28 Ekim 2019 Pazartesi – 3 Kasım 2019 Pazar

Data source: FluNet (www.who.int/flunet). Global Influenza Surveillance and Response System (GISRS)
Data generated on 08/11/2019

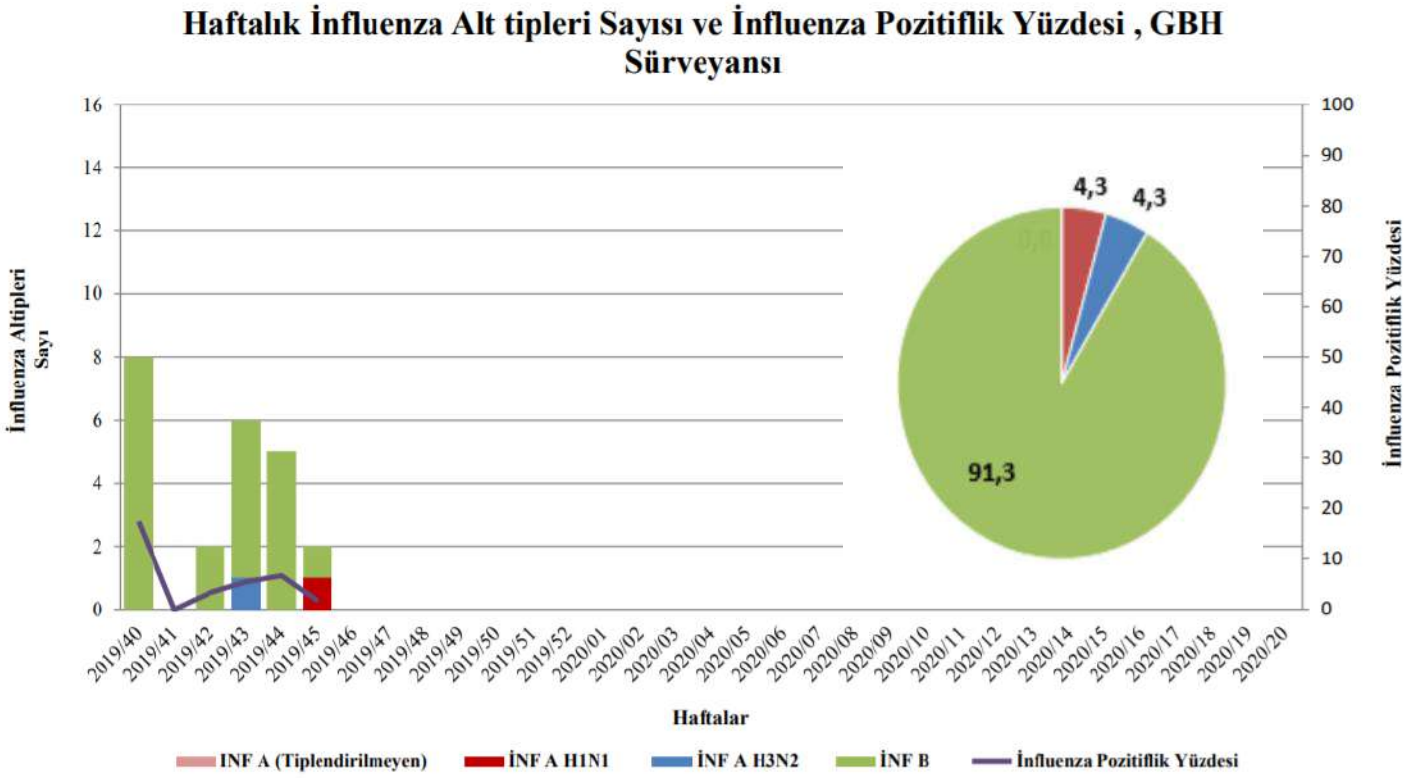
https://www.who.int/influenza/surveillance_monitoring/updates/2019_11_11_surveillance_update_354.pdf?ua=1

USA; 2019-2020



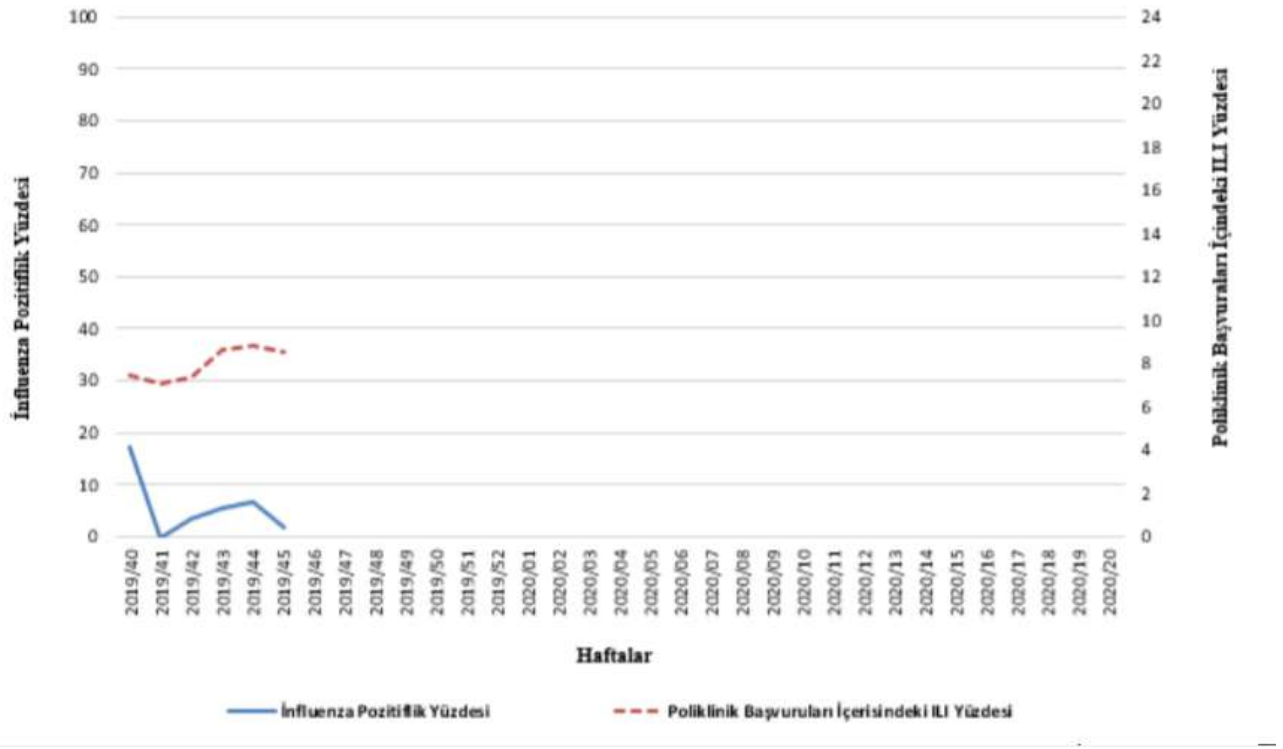
Türkiye 2019-2020

Sentinel örnek
23 / 456
%5



Türkiye 2019-2020

Sentinel ILI Sürveyansı Numunelerindeki İnfluenza Pozitiflik Yüzdesi ve Poliklinik Başvuruları İçerisindeki İnfluenza Benzeri Hastalık Yüzdesi, 2019-2020 İnfluenza Sezonu.

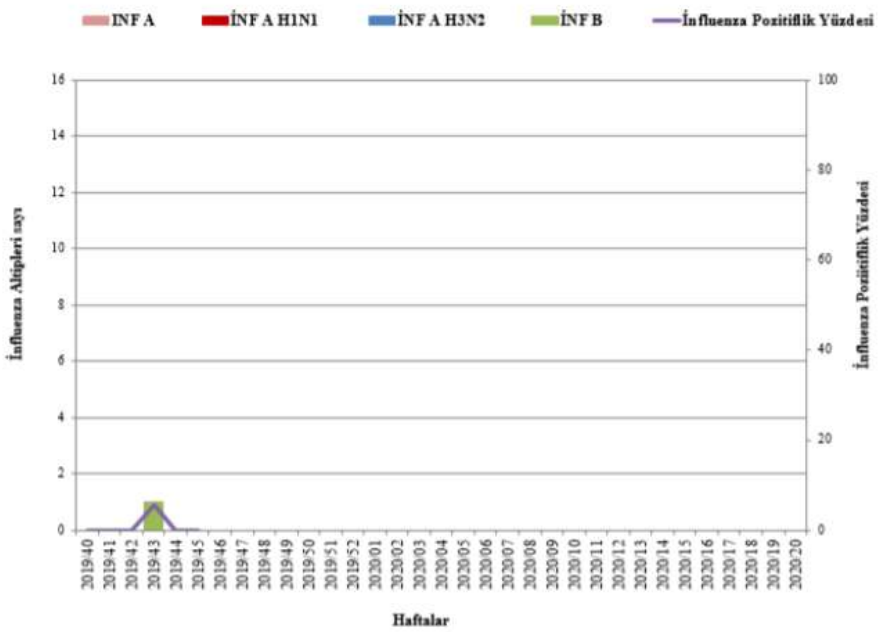


Türkiye 2019-2020

2019/40. hft. itibaren

Ağır akut solunum yolu enfekşiyonu (SARI) nedeniyle hastaneye yatan hastalardan alınan 143 sentinel örnekte 1 influenza B virüsü tespit edilmiştir

Sentinel SARI Numunelerindeki İnfluenza Pozitiflik Yüzdesi, İnfluenza Alt tipleri Sayısı ve Pozitif Numunelerin Alt Tipinin Yüzde Dağılımı, 2019-2020 İnfluenza Sezonu.



Aşı Endikasyonunda Yüksek Öncelikli Grup

- Gebeler
- ≥65 yaş -- <5 yaş
- Kronik hastalığı olanlar
  - Kardiyak, Pulmoner, renal, metabolik, KC, hematolojik, nörolojik, kan hastalıkları
- İmmün yetmezliğe neden olan durumlar
  - HIV, kemoterapi, Malignite, steroid
- <19 yaş, uzun süreli aspirin tedavisi alanlar
- Yaşlı bakim evinde kalanlar
- Riskli kişiler
  - Sağlık personeli
  - Aynı evde yaşayanlar

Etkinlik

- Hastalığın ağır geçirilmesini engelliyor
  - Hastaneye yatış gerektiren vakalarda şiddetli influenza [aOR] 0.42, 95% CI 0.22-0.80)
    - Castilla J. Clin Infect Dis. 2013
- İnfluenza pnömonisini azaltıyor
  - % 57 (%95 CI 32-73)
    - Griffin Mr. JAMA. 2015
- Akut MI atağını azaltıyor
  - aOR 0,81 (%95 CI 0,77-0,85)
    - Siriwarden AN. CMAJ. 2010

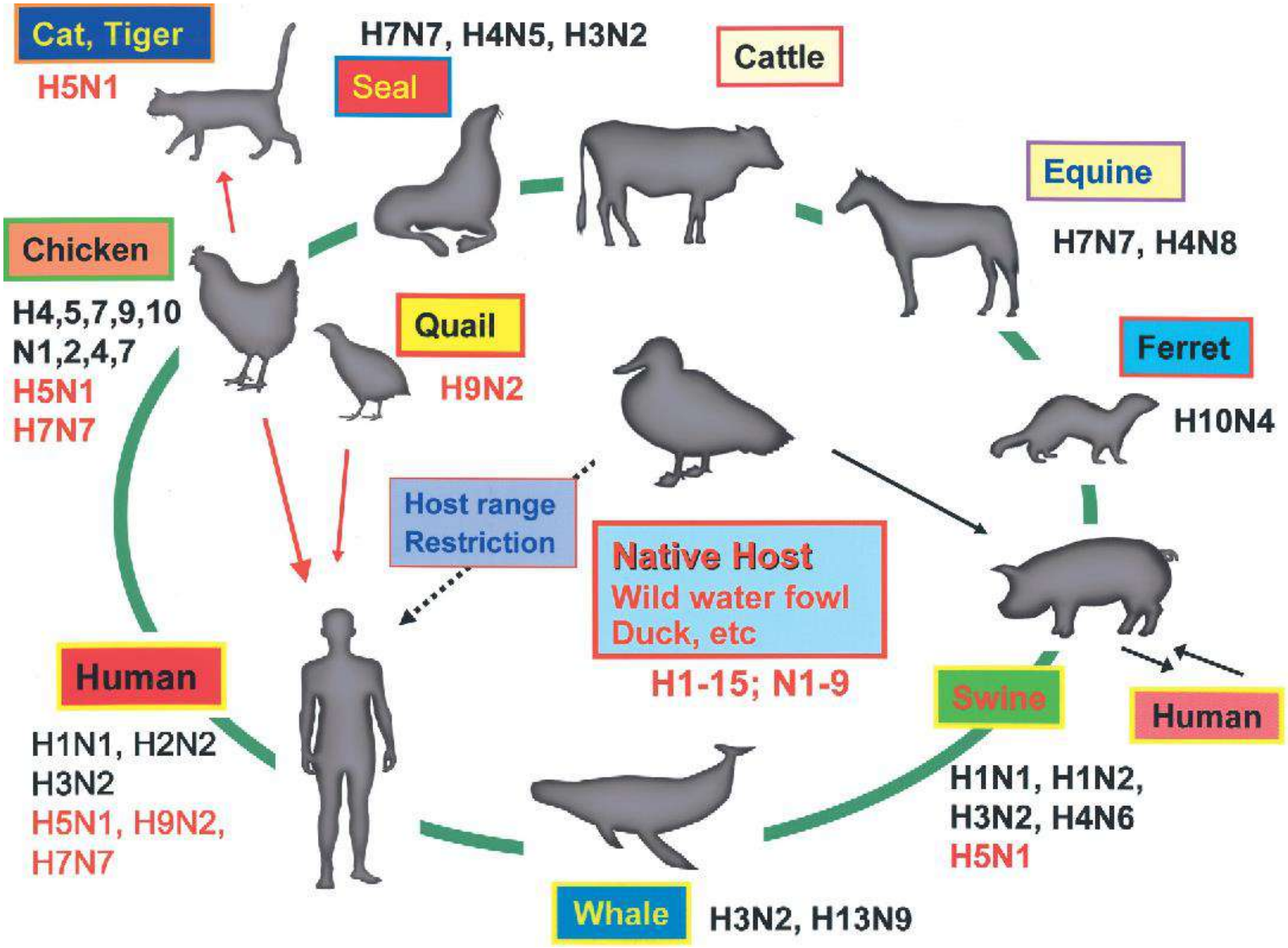
Avian influenza

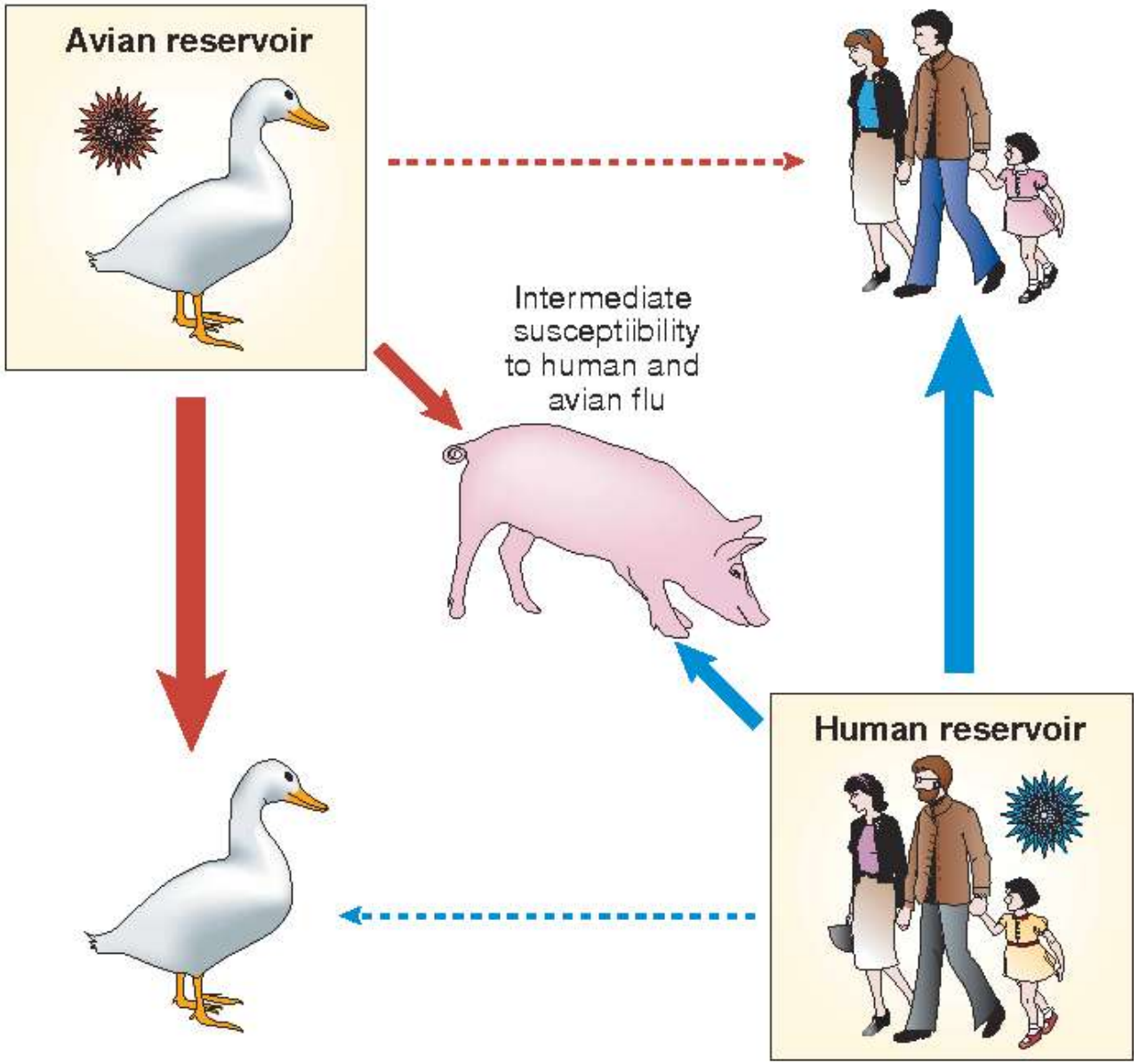
Cumulative number of confirmed human cases for avian influenza A(H5N1) reported to WHO, 2003-2019

Country	2003-2009*		2010-2014**		2015		2016		2017		2018		2019		Total	
	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths
Azerbaijan	8	5	0	0	0	0	0	0	0	0	0	0	0	0	8	5
Bangladesh	1	0	6	1	1	0	0	0	0	0	0	0	0	0	8	1
Cambodia	9	7	47	30	0	0	0	0	0	0	0	0	0	0	56	37
Canada	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	1
China	38	25	9	5	6	1	0	0	0	0	0	0	0	0	53	31
Djibouti	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Egypt	90	27	120	50	136	39	10	3	3	1	0	0	0	0	359	120
Indonesia	162	134	35	31	2	2	0	0	1	1	0	0	0	0	200	168
Iraq	3	2	0	0	0	0	0	0	0	0	0	0	0	0	3	2
Lao People's Democratic Republic	2	2	0	0	0	0	0	0	0	0	0	0	0	0	2	2
Myanmar	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Nigeria	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Pakistan	3	1	0	0	0	0	0	0	0	0	0	0	0	0	3	1
Thailand	25	17	0	0	0	0	0	0	0	0	0	0	0	0	25	17
Turkey	12	4	0	0	0	0	0	0	0	0	0	0	0	0	12	4
Viet Nam	112	57	15	7	0	0	0	0	0	0	0	0	0	0	127	64
Total	**468**	**282**	**233**	**125**	**145**	**42**	**10**	**3**	**4**	**2**	**0**	**0**	**0**	**0**	**860**	**454**

2006

Avian influenza neden önemli?

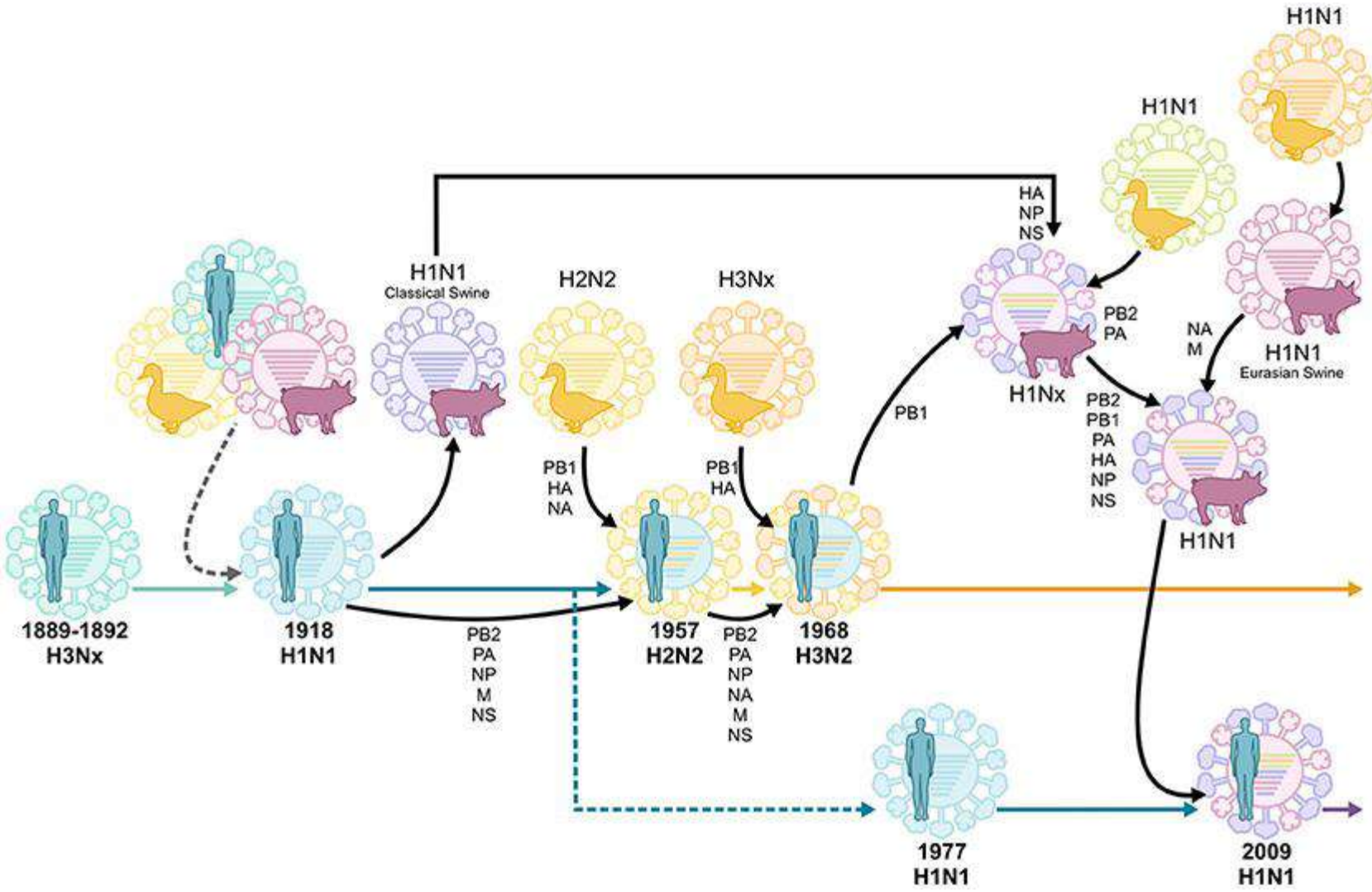




Molecular constraints to interspecies transmission of viral pathogens

Richard John Webby. Published in Nature Medicine 2004

2009 Pandemik İnfluenza



H3N2 variant influenza

- H3N2 (domuz) ve H1N1 (insan)
- İnfluenza A H3N2v (M gen 2009 H1N1)
  - İlk olarak 2010'da USA'de domuzlarda
  - İlk insan vakası 2011'de USA
  - 12 olgu / 2011
  - 309 olgu / 2012
  - Sporadik vakalar tespit edilmeye devam ediyor

Avian H7N9 influenza

- H7N9 kuşlarda saptandı
- 2013'de insan vakaları ilk olarak Çin'de saptandı
- İnsan ve kuşlarda saptanmaya devam ediyor
- İnsanda şiddetli hastalık
  - Ağır pnömoni
  - ARDS
  - Septik şok ve MODS
- İnsandan insana geçiş henüz rapor edilmedi

https://www.who.int/en/news-room/fact-sheets/detail/influenza-(avian-and-other-zoonotic)


NO MORE
EXCUSES
THERE ARE MANY PLACES
TO GET YOUR FLU VACCINE.