



Intensivistendagen 2023

10 februari 2023

umcg



Prof. dr. Andreas Voss

Medical Microbiology and Infection Control
UMC Groningen, The Netherlands



Recent (2022/23): geen



disclosure

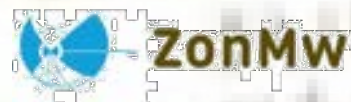
In het verleden:

INTERREG
Deutschland
Nederland



Momentum
BioScience

JAMA



AstraZeneca

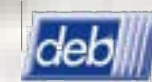


Ministerie van Volksgezondheid,
Welzijn en Sport

ECOLAB



3M



UVDI



OPARDT



De volgende pandemie
(toekomstige infecties)

Niemand had echt een idee over
(de impact van) een pandemie



why?

Pandemics in history

1720 Great Plague of Marseille (1720)

1820 First Cholera Pandemic (1817)

1920 Spanish Flu (1918)

2020 COVID-19 (2019)



Influenza



Cholera



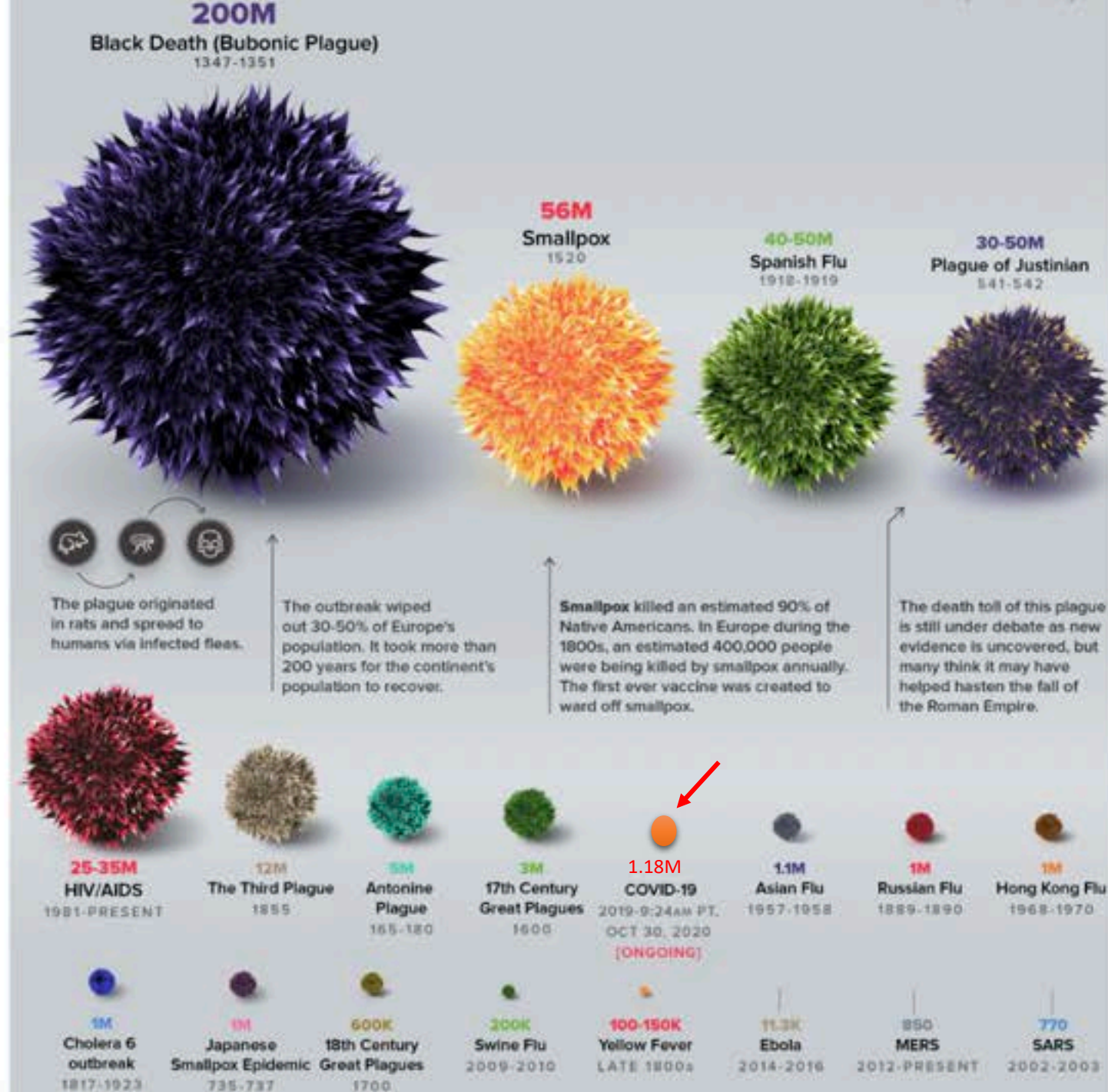
Plague

Historical Pandemic Death Tolls

Oct 30, 2020: 1,18M

Jan 31, 2023: 6,82M

COVID-19 is between the 17th century plagues and the 1957-8 Asian Flu





What to expect post COVID?

(a general remark)

This will hurt healthcare & HCWs for a long time ...

Why even
stay in
healthcare?

How to prevent the
post-COVID health-collaps?



How to stop the bad habits?

- Non-compliance
- Tired of measures
- Wrong PPE use
- Disregarding rules
- Too many € spent
- Sick-leave
- Vaccination



BAD HABITS



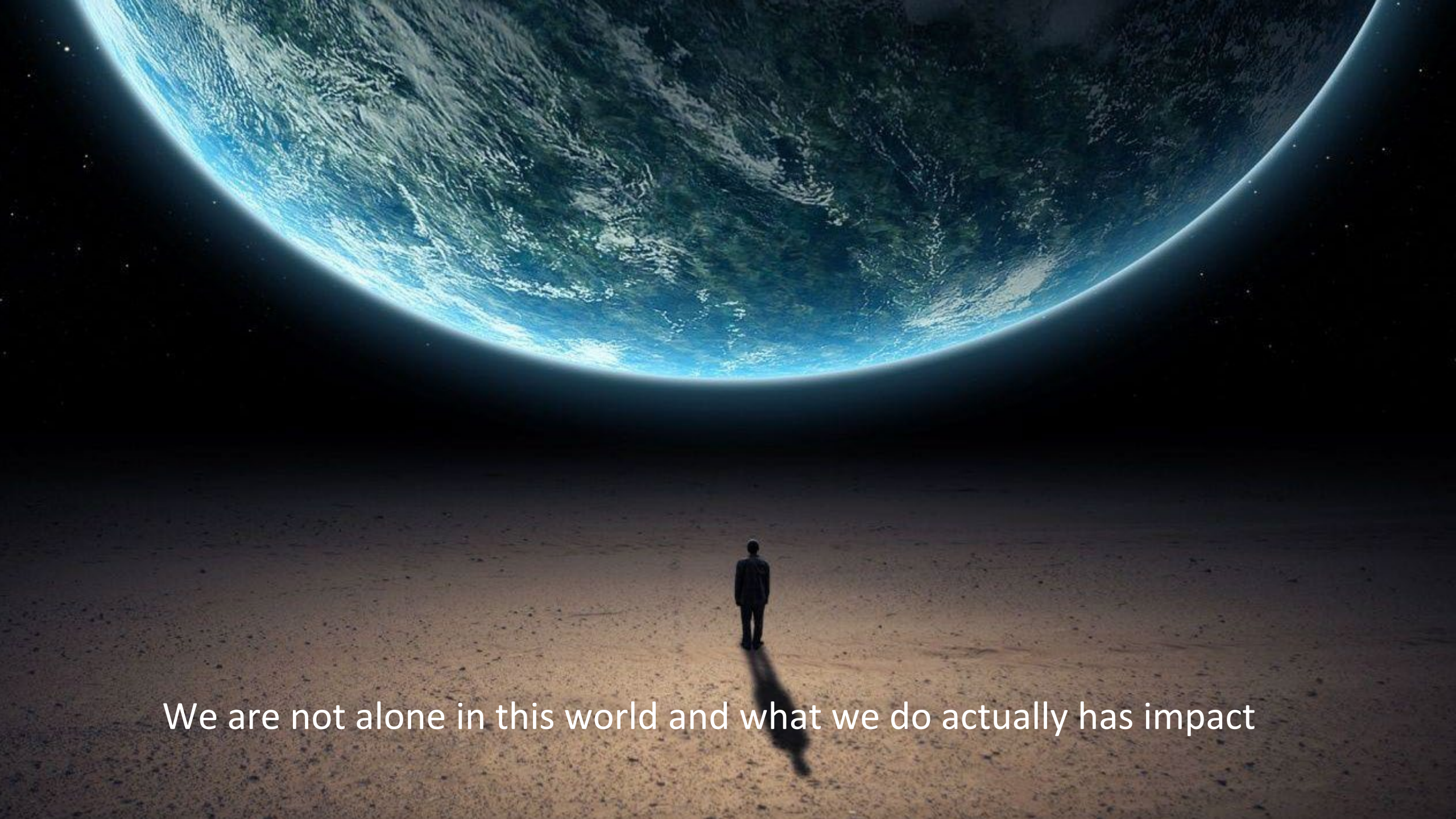
When to expect the next pandemic?



Prediction is very
difficult, especially
about the future.

Niels Bohr

What isn't difficult to predict ...



We are not alone in this world and what we do actually has impact

An example ...





OPINION/HYPOTHESIS

Host-Microbe Biology

July/August 2019 Volume 10 Issue 4 e01397-19

<https://doi.org/10.1128/mBio.01397-19>

On the Emergence of *Candida auris*: Climate Change, Azoles, Swamps, and Birds

Arturo Casadevall ^a, Dimitrios P. Kontoyiannis ^b, Vincent Robert^c

^aDepartment of Molecular Microbiology and Immunology, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA

^bDivision of Internal Medicine, The University of Texas MD Anderson Cancer Center, Houston, Texas, USA

^cWesterdijk Fungal Biodiversity Institute, Utrecht, Netherlands

ABSTRACT The most enigmatic aspect of the rise of *Candida auris* as a human pathogen is that it emerged simultaneously on three continents, with each clade being genetically distinct. Although new pathogenic fungal species are described regularly, these are mostly species associated with single cases in individuals who are immunosuppressed. In this study, we used phylogenetic analysis to compare the temperature susceptibility of *C. auris* with those of its close relatives and to use these results to argue that it may be the first example of a new fungal disease emerging from climate change, with the caveat that many other factors may have contributed.

1 Global warming is responsible for raising the ambient climate temperatures, which selects fungal clades that can reproduce at avian and mammalian basal temperatures.



Wetlands

2 *Candida auris* previously existed as a plant saprophyte that gained thermotolerance and salinity tolerance as a result of the effects of climate change on the wetland ecosystem.



3 Thermotolerant *C. auris* may have been transplanted by birds across the globe to rural areas where human and birds are in constant contact.

Rural environment



4 Rural environment activities (e.g., farming) provide the opportunity for interspecies transmission of virulent pathogens such as *C. auris*

Urban environment

Hospital

5 Human migration towards urban areas eventually led *C. auris* into health care environments.

The next pandemic will be sooner than 100 years from now !

75%
new infectious diseases

- Global warming & disrupted ecosystems
- Pollution
- Nature versus civilization/exploding populations
- Food (wild animals, mega-production)
- Global travel
- Bioterrorisme



RISICO



The next pandemic will be sooner than 100 years from now



CRISIS

- Global warming & climate change
- Pollution
- Nature versus civilization
- Food (wild animals, meat)
- Global travel
- Bioterrorism



Zoönotische infecties

- ◎ **1400** soorten micro-organismen bekend als **pathogeen** voor de mens
- ✧ Waarvan **17** soorten worden gezien als nieuw opgedoken micro-organismen welke aanleiding kunnen geven tot de zogenaamde **'emerging infections'**



Zoönotische infecties

📍 **1400** soorten **zoönotische pathogeen**

voor de mens

✦ Waarvan **17** soorten opgedoken micro-organismen zijn zogenaamde 'emerging infections'



What type of micro-organism will it be?

Respiratory Virus

... probably RNA virus as they easily mutate

When will it be?

JOURNAL ARTICLE CORRECTED PROOF

Viral Genetic Determinants of Prolonged Respiratory Syncytial Virus Infection Among Infants in a Healthy Term Birth Cohort

Dylan Lawless, Christopher G McKernan, Surman R Das, Thomas Junier, Zhi Ming Xu, Larry J Anderson, Tebeb Gebretzadik, Meghan H Shlitz, Emma Larkin, Christian Rosas-Salazar ... Show more

Author Notes

The Journal of Infectious Diseases, jiaa442, <https://doi.org/10.1093/infdis/jiaa442>
Published: 15 November 2022 Article history

REVIEW ARTICLE

The Role of Swine in the Generation of Novel Influenza Viruses

W. Ma¹, K. M. Lager², A. L. Vincent³, B. H. Janke⁴, M. R. Gramer⁵ and J. A. Richt^{1,4}

¹ Department of Diagnostic Medicine/Pathobiology, College of Medicine, Kansas State University, Manhattan, KS, USA
² Virus and Host Diseases of Livestock Research Unit, National Animal Disease Center, Ames, IA, USA
³ Department of Veterinary Diagnostic and Population Animal Medicine, College of Veterinary Medicine, Iowa State University, Ames, IA, USA
⁴ University of Minnesota Veterinary Diagnostic Laboratory, College of Veterinary Medicine, St. Paul, MN, USA

USDA Animal and Plant Health Inspection Service

2022-2023 Detections of Highly Pathogenic Avian Influenza in Wild Birds

A worrisome new bird flu is spreading in American birds and may be here to stay

Not
years

1000



Een voorspelling .. over 3 generaties doctors*



- de jonge klare
 - groot epidemie zeker, pandemie waarschijnlijk



- de enthousiast professional
 - grote kans op groot epidemie



- de amazing senior
 - was de enige pandemie

The good news for the IC community ...

... what do our colleagues from other labs do?



ICU Care gets enhanced not replaced, but will face (new) challenges

MC
MEDISCH CONTACT

 Dorothée Halferisch

nieuws

Patiënten aan in pilot

6 reacties

Zou het kosten besparen en zou het patiënten helpen als ze zelf hun bloedonderzoek kunnen aanvragen, voorafgaand aan een huisartsbezoek? Een pilot van **Homelab**, een onlineplatform om zelf diagnostiek aan te vragen, moet dat duidelijk maken.

Primary Care
Dental
Labs
Vision
Hearing
Counseling
(Publ Health)



Challenges doe to infections

- ⊙ Infecties van dieren, die de species-barrière naar de mens oversteken en ernstige ziekten veroorzaken
- ⊙ Vector-overdraagbare zoönose
- ⊙ Ziekteverwekkers die van mens op mens kunnen overgaan
- ⊙ Antibiotica resistenties
- ⊙ Technische ontwikkelingen

Refugees ...

**'Tbc en schurft onder vluchtelingen
Heumensoord'**

Aanbevelen Delen 300 Tweet 0 0

GERELATEERD NIEUWS

**Agent bang voor ziektes bij
beveiliging vluchteling**


**Schurft, krentenbaard en
luizen bij asielzoekers**

Uitbraak mazelen in vluchtelingenkamp Calais

5/21/16, 10:06 - from ANP@your360

Crowding

- Snelle verspreiding = risico grote uitbraken
- Met name respiratoire infectie



Common and uncommon infections

- Malaria
- (MDR-) tuberculose
- Mazelen
- Brucellosis
- Relapsing fever,
(*B. recurrentis*, kleer-luis)
- HIV
- Meningokokken
- Buiktyphus
- Shigellosis
- *Scabies*
- Hepatitis
(the whole alphabet)
- Cutane diphtherie
- Rabies

Common and uncommon infections

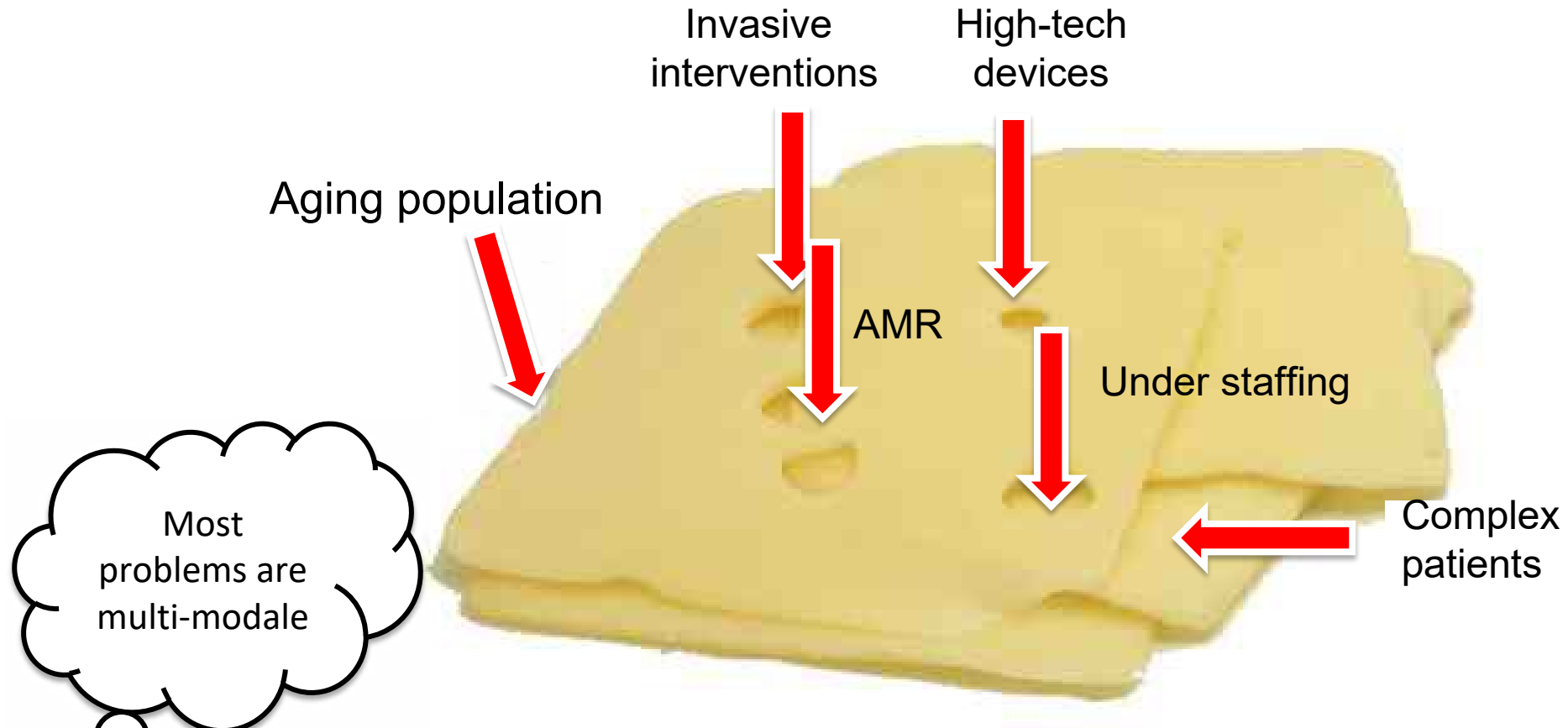
Incubatietijd < 14 dagen

DISEASE	USUAL INCUBATION PERIOD (RANGE)
Chikungunya	2–4 days (1–14 days)
Dengue	4–8 days (3–14 days)
Encephalitis, arboviral (Japanese encephalitis, tickborne encephalitis, West Nile virus, other)	3–14 days (1–20 days)
Enteric fever	7–18 days (3–60 days)
Acute HIV	10–28 days (10 days to 6 weeks)
Influenza	1–3 days
Legionellosis	5–6 days (2–10 days)
Leptospirosis	7–12 days (2–26 days)
Malaria, <i>Plasmodium falciparum</i>	6–30 days (98% onset within 3 months of travel)
Malaria, <i>P. vivax</i>	8 days to 12 months (almost half have onset >30 days after completion of travel)
Spotted-fever rickettsiae	Few days to 2–3 weeks

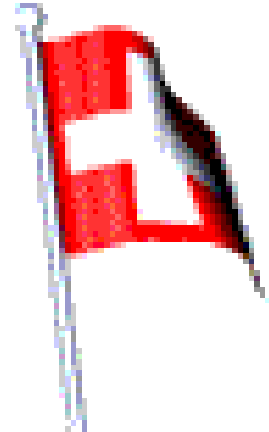
Incubatietijd > 14 dagen

DISEASE	USUAL INCUBATION PERIOD (RANGE)
Incubation 14 Days to 6 Weeks	
Encephalitis, arboviral; enteric fever; acute HIV; leptospirosis; malaria	See above incubation periods for relevant diseases
Amebic liver abscess	Weeks to months
Hepatitis A	28–30 days (15–50 days)
Hepatitis E	26–42 days (2–9 weeks)
Acute schistosomiasis (Katayama syndrome)	4–8 weeks
Incubation >6 weeks	
Amebic liver abscess, hepatitis E, malaria, acute schistosomiasis	See above incubation periods for relevant diseases
Hepatitis B	90 days (60–150 days)
Leishmaniasis, visceral	2–10 months (10 days to years)
Tuberculosis	Primary, weeks; reactivation, years

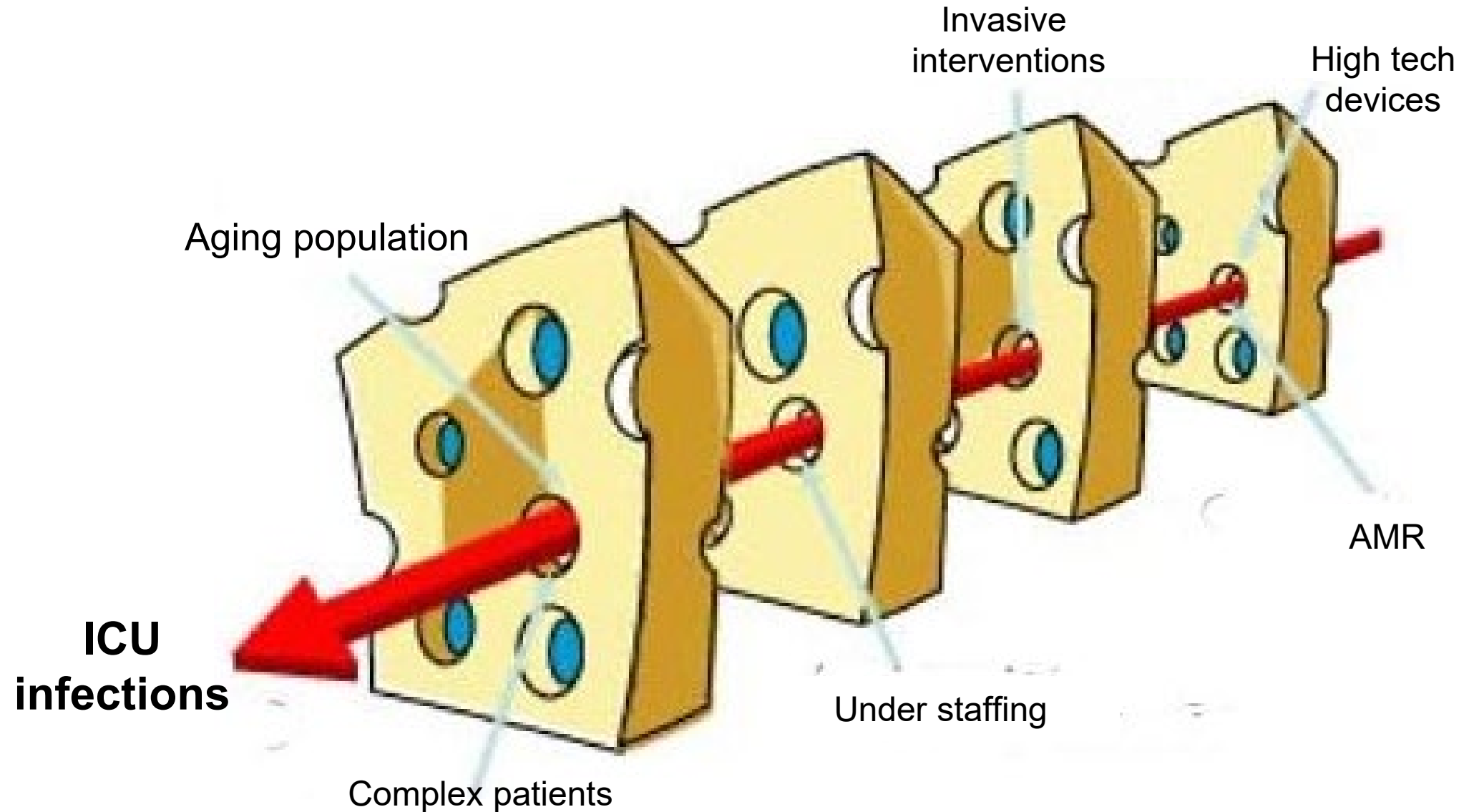
Explaining ICU challenges using the Swiss cheese accident model



Most problems are multi-modale



Why infections will continue to be your big challenge





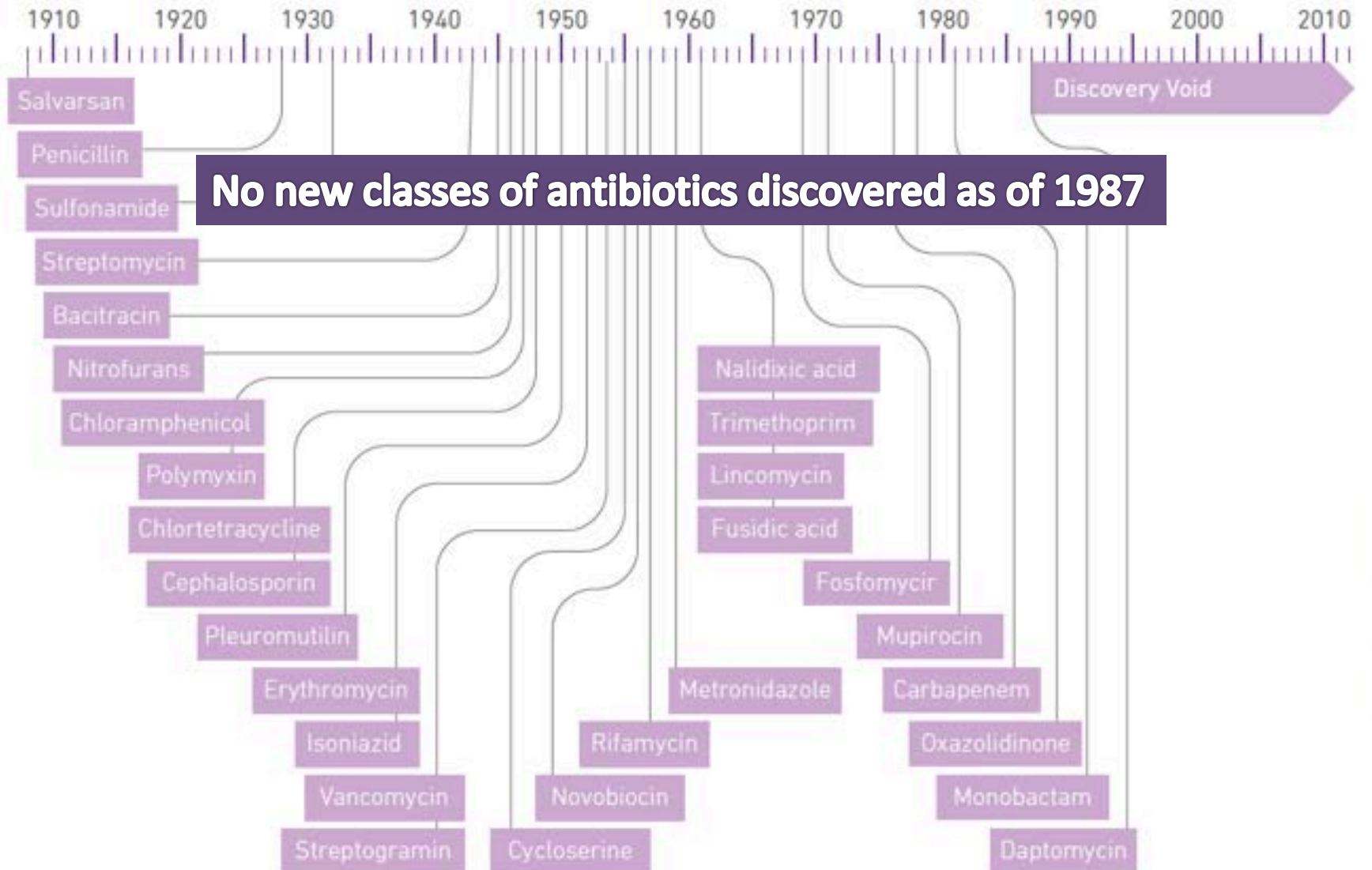
RISE OF THE SUPERBUGS

Resistance to antibiotics could bring "the end of modern medicine as we know it", WHO claim

The world is entering an antibiotic crisis which could make routine operations impossible and a scratched knee potentially fatal, the head of the World Health Organisation has claimed.

Figure 1 Dates of discovery of distinct classes of antibacterial drugs

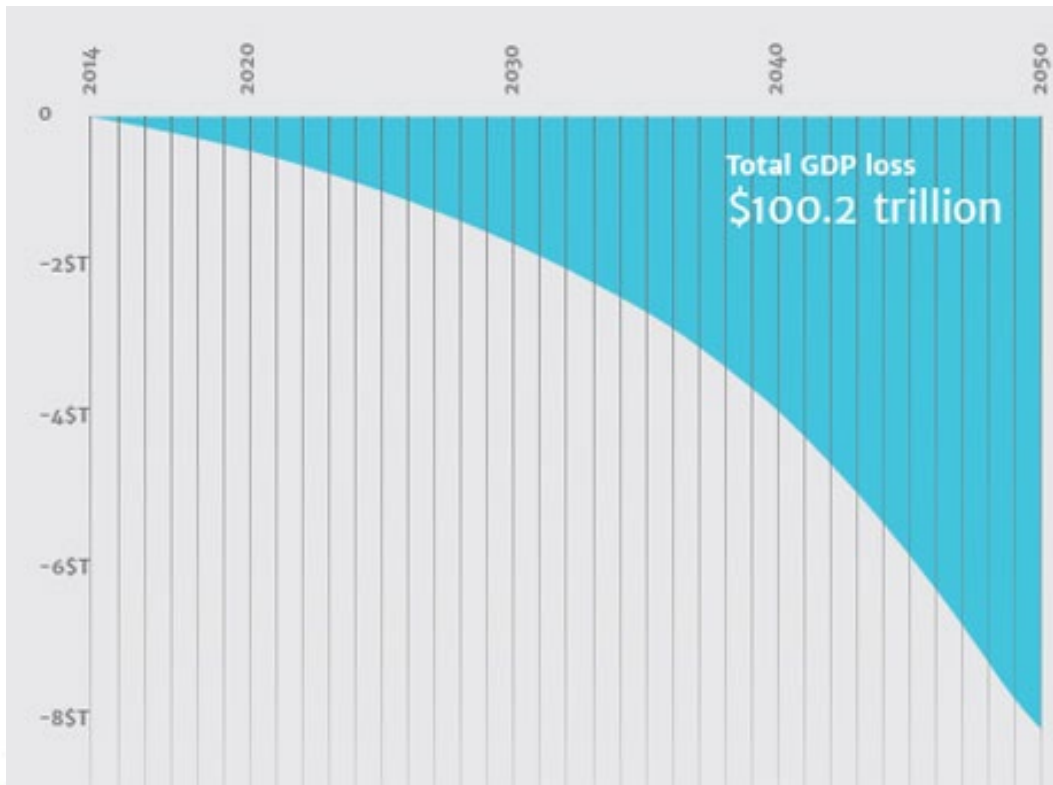
Illustration of the "discovery void." Dates indicated are those of reported initial discovery or patent.



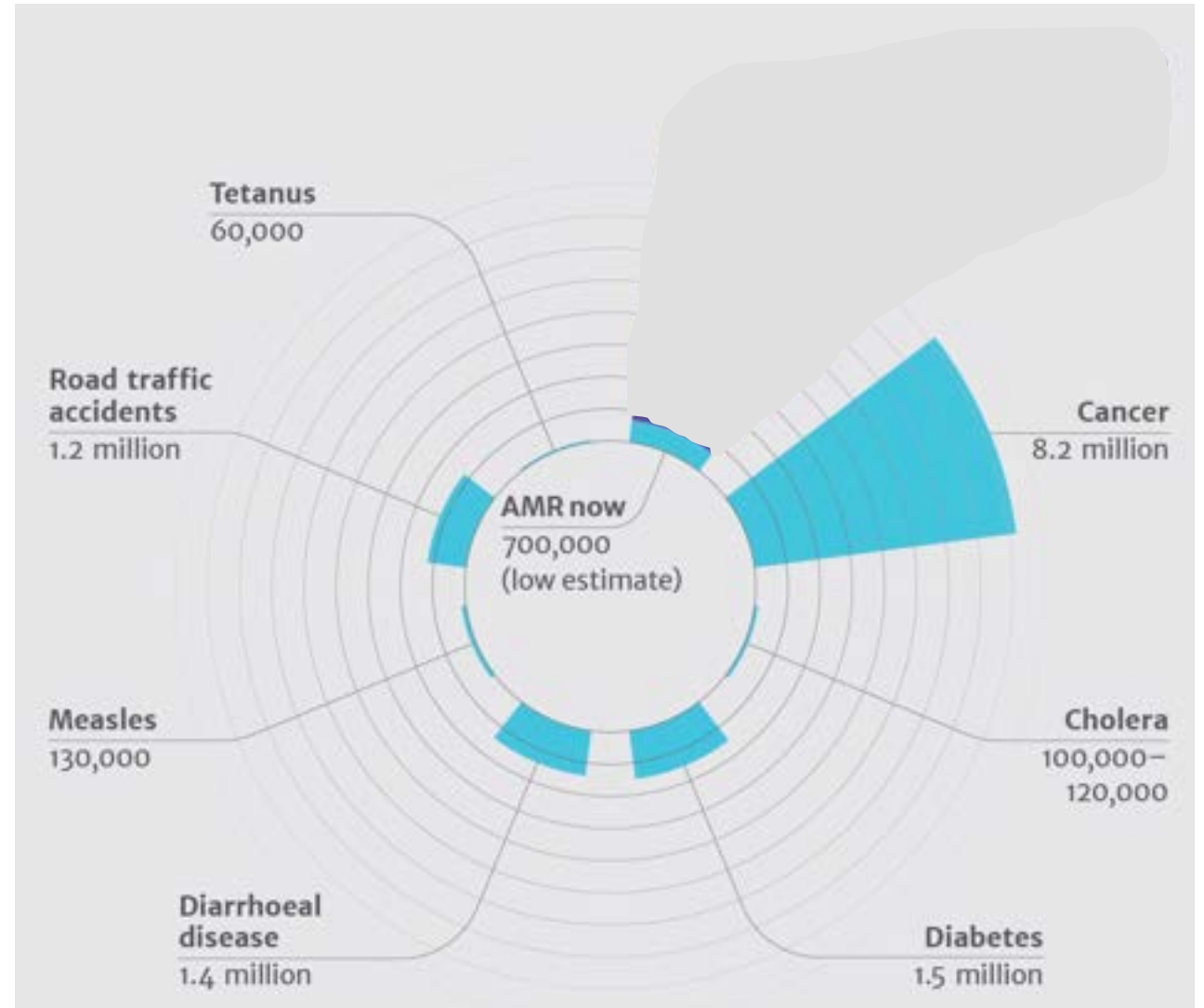
Adapted from Silver 2011 (1) with permission of the American Society of Microbiology Journals Department.

Impact on World GDP & Mortality

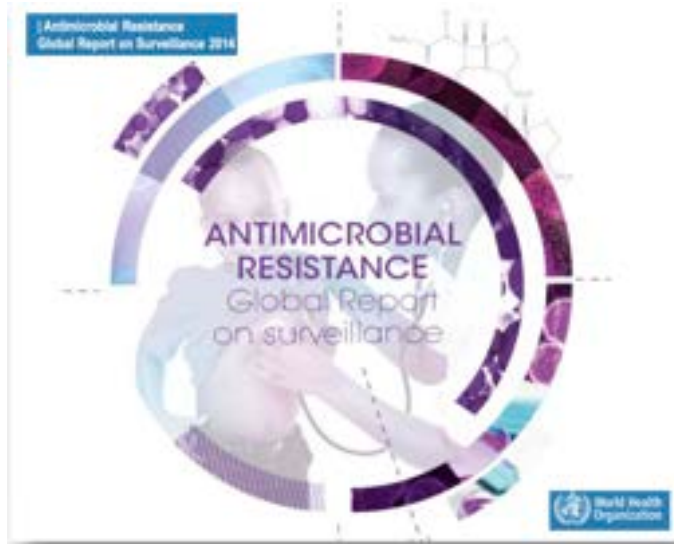
Jim O'Neill
Review on
Antimicrobial
Resistance 2014



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Estimated Burden of AMR



Global information is insufficient to show Complete disease burden impact & costs

<http://www.who.int/drugresistance/documents/surveillancereport/>



European Union population 500m

25,000 deaths per year

2.5m extra hospital days

Overall societal costs
(€ 900 million, hosp. days)
Approx. €1.5 billion per year



Source: ECDC 2007

United States population 300m

>23,000 deaths

>2.0m illnesses

Overall societal costs
Up to \$20 billion direct
Up to \$35 billion indirect



Source: US CDC 2013

What do most clinicians know about the safe use and reprocessing of their devices?



Some consider technology fool-proof ...

1. There is nothing HCWs can't do, including messing up something fool-proof
2. By definition; the more complicated instruments/devices get – the bigger the IPC trouble
3. Nothing beats an IT update (preferably online without anyone knowing about it)
4. It's the admin's wrongdoing, because they wanted to save money (sorry, not the latest model, but close and about the same)



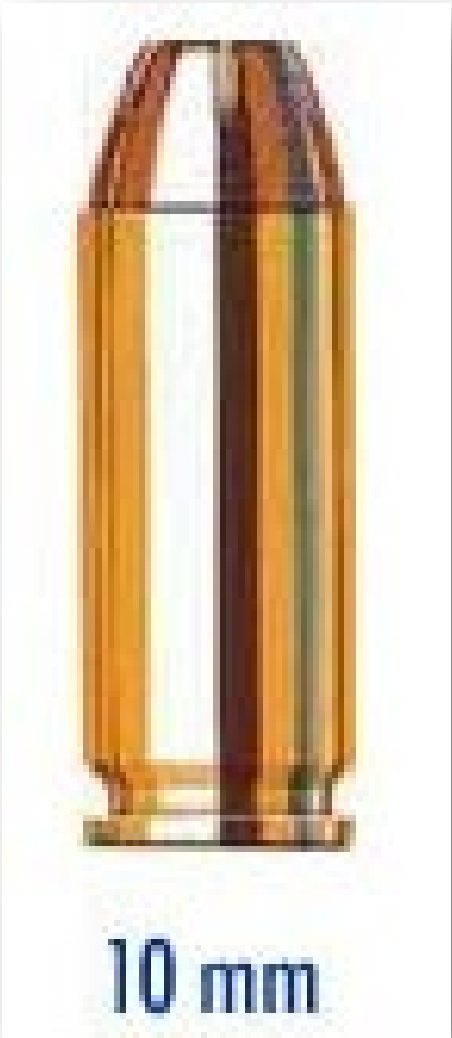
10 mm can be deadly



10 mm

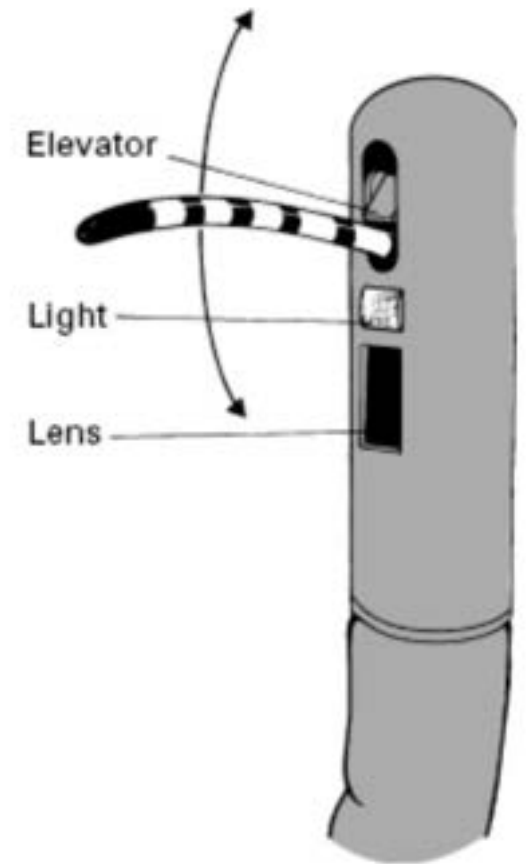


... so can 2 mm

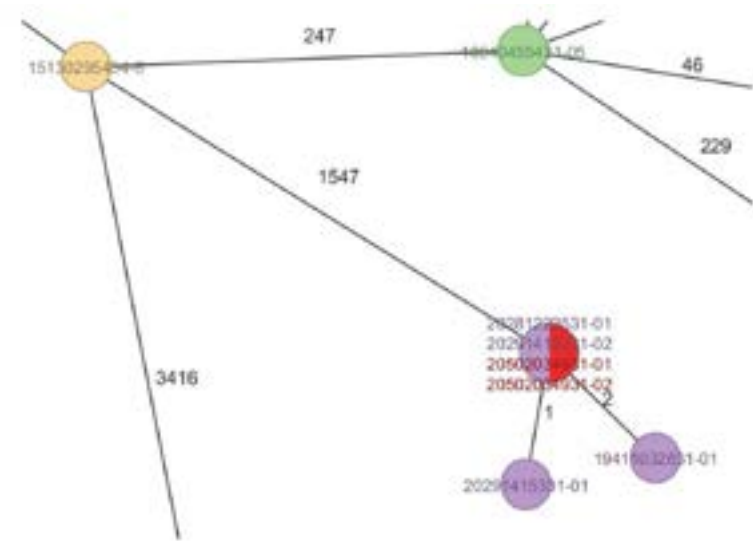


ERCP scope contaminated with ESBL-m.o.'s

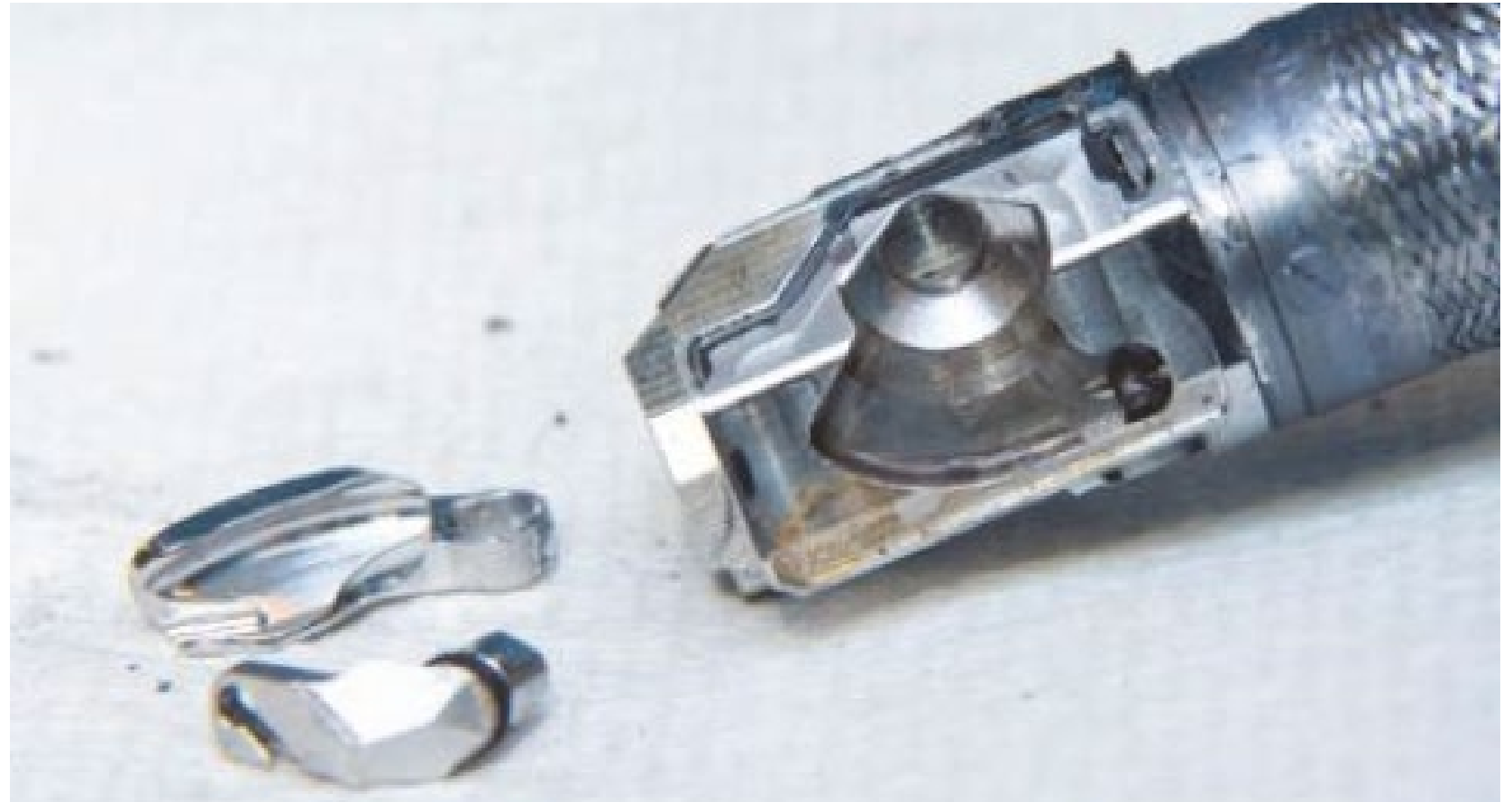
- Transmission of ESBL-Cireobacter via ERCP scope in 2020
- Contact tracing revealed other pts and other m.o.'s (3 CIFR ESBL, 3 KLPN ESBL's)
- Scope cultures repeatedly negative, but found spot in channels with fiberscope
- Scope was taken apart, piece by piece, damaged part was culture en 23S PCR negative, but found "The Klebsiella" at elevator.



The culture-positive forceps elevator scope



Same finding detected
with other scopes



→ **Negative scope-cultures** (state-of-the-art) not a guarantee that an accurately cleaned scope is actually safe



“Try to clean us”



Technology can support, help and advance health-care ...



but, people do not always act smart; happens everywhere





What to expect for next pandemic?

Mijn hoop voor de volgende pandemie ...

PANDE

MIC

NOT
NOR
MAL

Een pandemie is niet "normaal" en onze reacties zouden ook "afwijkend" moeten zijn